THE IRON TRADE REVIEW

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BUILDING PLANS

CALL FOR LARGE TONNAGE OF SHAPES.

Pig Iron Market Varies in Different Centers—Strongest in the East—Coke and Scrap Weak.

The strongest feature of the market is the tremendous demand for structural material, while not a less interesting condition, perhaps because somewhat perplexing, is presented by pig iron.

Building Plans. On account of the very large amount of building which has been done during the favorable weather this winter, it has been supposed that the demand for building operations to be started in the spring might not be so strong, but all indications show that this will not be true. The projects now in the hands of Chicago architects and contractors call for fully 75,000 tons of structural material, not including the very extensive plans of the United States Steel Corporation for the new works at Tolleston, Ind.; new buildings in New York City will demand 10,000 tons of steel; on the Pacific coast 25,000 tons will be required in the near future, while Pittsburg, Cleveland and other cities have extensive plans for improvements.

Pig Iron Situation. Although the buying of pig iron in the east is not quite as active, the market is strong; in the central west there is an increasing tendency on the part of buyers to defer placing orders because of their belief that lower prices will prevail, and while a few weeks ago it was easy to sell for the second half delivery, that is not now the case; southern No. 2 foundry is more freely offered at $14 Birmingham, although some producers are quoting $14.50; the Chicago market is quiet, and signs of weakness have disappeared. In the central west, where there has been more weakness than elsewhere, no fear is expressed on the part of sellers that this condition will continue. The very strong conditions prevailing in finished lines are pointed to as furnishing evidence that weakness in pig iron cannot last long, and it is confidently expected that the sagging tendency noted during the last two weeks will be temporary.

Rail Sales Continue. Activity in steel rails is still marked. Among the sales of the past week were 12,000 tons for a Pacific coast electric railway, 28,000 tons for the N. Y., N. H. & Hartford, and 10,000 for the Southern Pacific. The total sales for January will exceed 250,000 tons.

Crude Steel Scarcity. The great activity of the mills is shown in the strong demand for crude steel, the supply of which is not equal to the demand. Old steel car wheel axles are being used wherever possible as a substitute for billets. The demand for wire products is unabated, and the destruction by fire of a large Alabama mill will add to the embarrassment in giving prompt delivery. Wire rods are scarce, especially in the Chicago district.

Bar Iron Declines. New orders for bar iron are not numerous or heavy and the price has declined $1 a ton. The consumption of steel bars does not decrease. The sheet and tin plate markets are reported satisfactory.

Pipe Foundries Are Busy. Pipe foundries are very busy; specifications are coming in freely. There is improved demand for boiler tubes and the warm weather has been favorable for merchant pipe interests. Much better delivery is being given on plates and new business is not so large.

Coke and Scrap Weak. Coke continues to decline in price, and delivery is given without difficulty. The scrap market is also weak. Eastern furnaces which were slow in placing their orders for ore are finding difficulty in buying to cover for their shortage up to the opening of navigation, and some of them have not yet placed orders for their full requirements after the opening of navigation. Furnaces of the central west are well supplied and the movement from docks to furnaces is very light.

LARGE EARNINGS

Of the Steel Corporation for Last Quarter — New Director Elected.

(Special Telegram.)

New York, Jan. 31.—Directors of the United States Steel Corporation at their meeting in this city yesterday elected Marvin Hughitt of Chicago to the vacancy on the directory board caused by the death of Marshall Field, and declared the regular quarterly dividend of 1¾ per cent on the preferred stock.

A statement of the operations of the company for the third quarter of the present fiscal year was issued. It showed total net earnings for the quarter of $35,278,688, divided as follows: October, $12,400,306; November, $11,827,215; December, $11,051,167. The surplus for the quarter after deducting charges for repairs, employes' bonuses, interest, depreciations, dividends, etc., is $16,416,563. These figures compare with net earnings of $31,240,582 for the quarter ending Sept. 30, last, when the surplus for the quarter was $10,678,613. Over the net earnings for the corresponding quarter of 1904 the present report shows an increase of $13,819,954. The directors set aside $4,000,000 for the purchase of property, new construction, etc., and $5,000,000 for contemplated appropriations and expenditures.

Unfilled orders on hand Dec. 31 were 7,605,086 tons, breaking all records of the corporation.

The annual report will probably be issued at the annual meeting in April, though it may come out earlier.

The annual meeting of the Wheeling Mold & Foundry Co., was held at Wheeling, Pa., Jan. 25, and the capital stock was increased from $200,000 to $300,000. The following officers were elected: C. E. Blue, president and general manager; L. B. Blue, vice president and H. S. Bradley, secretary-treasurer. The directors are: Albert Whitaker, C. E. Blue, Chas. Copp, B. W. Peterson, W. B. Jones and L. B. Blue

THE WEEK IN IRON CENTERS.

PITTSBURG.

Market Shows Much Strength, But Not Uniformly Active.

OFFICE OF *The Iron Trade Review*,
521 PARK BUILDING, January 30

Conditions of the iron and steel market in the Pittsburg district represent a striking tribute to the strength of the situation. With the immense amount of iron which has been sold, and the fact that the open weather has been favorable to the production of a much greater tonnage than is usual throughout the winter months, and that this practical surplus has been disposed of at market prices without breaking the market, the situation is looked upon as a little short of remarkable. There have been some signs of weakness, but this has been confined more particularly to the coke and scrap markets. Pig iron, while it has not been particularly active, has not shown a definite weakness; in fact Bessemer iron is still strong with a considerable buying movement on in a quiet way, nothing larger than 8,000 tons of Bessemer at $17.50 valley furnaces being reported, while on small lots of a few hundred tons each $17.75 has been paid. A sale of 10,000 to 15,000 foundry iron half northern and half southern is reported. It is not thought the steel corporation will negotiate for further second quarter iron for some time at least. The leading interest is now operating fifty-two of its fifty-three blast furnaces, the only idle one being No. 2 at the Isabella plant. This record has not been equaled for over a year.

In finished lines conditions remain about the same as they have been for some time past and tonnage outputs in several instances have been curtailed on account of a scarcity of semi-finished material. In conformity to the advance last week in tank plate to the Pacific coast the price of structural material for the coast was this week advanced to the 1.60c base, the former base being 1.40. Steel bars were also advanced from 1.25c base to 1.35c base, or $2 per ton, effective only to Pacific coast users. Domestic users on proof of export will receive a corresponding refund. An advance in wire products is anticipated shortly after Feb. 1.

Pig Iron.—The market is one of comparative quiet rather than one of weakness, there being a latent strength evident although the actual transactions have not amounted to any great tonnage. One sale of 8,000 tons of Bessemer was made on the basis of $17.75 valley furnace, and several small sales of a few hundred tons each were made at $17.75, valley furnace. The first real activity in gray forge iron since last fall was noticeable this week when 6,000 tons was sold at $16.40, valley. Northern No. 2 foundry has not been particularly active and $17.50, valley furnace, is the prevailing quotation. One sale of 1,500 tons was made at $18.50 Pittsburg, equal to $17.65 valley furnace. The jobbing market aside from the strictly steel making interests looks like a revival. One large Pittsburg interest during the past ten days bought between 10,000 and 15,000 tons of foundry iron, divided about equally, northern and southern, with the strict understanding that no price be made public. It is not likely that the steel corporation will be in the market for additional second quarter iron for some time to come. Of its 53 furnaces, but one is idle, a record not equaled in over a year. We quote:

Bessemer Valley	$17.50 to 17.75
Bessemer, Pittsburg	18.35 to 18.60
No. 1 Foundry, Pittsburg	18.50 to 19.00
No. 2 Foundry, Pittsburg	18.35 to 18.85
Gray Forge, Pittsburg	17.25 to 17.50
Basic, Valley	17.25 to 17.50
Basic, Pittsburg	18.10 to 18.35

Ferro-Manganese.—There has recently been considerable English ferro-manganese imported, but for prompt delivery the situation is but little, if any, improved. The market is about $150 for spot delivery. The English material is coming largely from India and Brazil. For second half year delivery $85 has been quoted, but with no guarantee.

Skelp.—While the pipe mills are busy the market quotations on skelp remain unchanged and we continue to quote: Bessemer grooved, 1.65c to 1.70c; sheared, 1.70c to 1.75c; basic, grooved, 1.65c to 1.70c; sheared, 1.70c to 1.75c; iron, grooved, 1.65c to 1.70c, sheared, 1.80c.

Muck Bar.—There has been some business done in muck bar during the week and we quote $31.50.

Rods.—While the nominal price of rods remains $37 to $38, mill, there are practically none to be had, the conditions at the mills being that the makers would rather run them through into finished material than sell them as rods.

Plates.—The price on marine steel, subject to inspection by United States government officials for steamboat boiler and similar work, has been advanced from .2c extra to .4c extra, effective at once. This has been made necessary by the stringent requirements made by Supervising Inspector General Geo. Uhler, of the steamboat inspection service. The extras are on the 1.60c base for tank plate. There has been quite a demand for ship plates, particularly from the coast yards, the Fore river yard and Cramps being in the lead. We continue to quote: Tank plate ¼ inch thick, 6¼ inches to 100 inches, 1.60c, f. o. b. mill, Pittsburg. Extras are as follows per 100 pounds: Flange and boiler steel, 10c; marine, A. B. M. A. and ordinary fire box, 40c; still bottom, 30c; locomotive fire box, 50c; plates over 100 inches up to 110 inches in width, not less than 5c extra; plates 110 inches to 115 inches wide, not less than 10c extra; 115 to 120 inches, not less than 15c extra; plates 120 inches to 125 inches wide, not less than 25c extra; plates 125 inches to 130 inches not less than 50c extra; plates 130 inches wide, not less than $1 extra; plates 5-16 inch thick, 10c extra; gauges 7 and 8, 15 cents extra; No. 9, 25c extra. Five cents extra for less than carloads. Terms net cash in 30 days, and for all points of delivery in the United States.

Tin Plate.—The capacity of the mills of the leading interest has been to a considerable extent curtailed by the inability to secure the semi-finished steel. The corporation during the past week started the Milland plant at Muncie, Ind., this having been idle for several months. The twenty mills at the South Sharon plant are now in operation and the officers of the company are on a trip of inspection of the various other plants and new developments are expected when they return. Work on repairs and new improvements are being rushed. We quote $3.50 per base box, f. o. b. Pittsburg, 14 x 20 100-lb. cokes, terms 30 days, less two per cent off for cash in 10 days. Some mills allow a 5c per box rebate on this price to the large trade.

Merchant Bars.—While the leading Pittsburg producers still maintain their quotation of 2.04¾c, Pittsburg, some eastern bar iron has been sold at 1.70c, mill, or 1.83c, delivered, Pittsburg. The heavy demand noticed a few weeks ago has diminished considerably, and the inquiry has fallen off. One of the leading producers has practically announced it does not want further business in bar iron. Leading producers of steel bars have announced an advance from 1.25c to 1.35c on shipments to the Pacific coast, local or domestic users not being affected. This is along the same line of policy adopted when structural shapes and plates were advanced to users on the Pacific coast. We continue to quote:

Common iron bars, from 1.85c to 1.90c, Pittsburg; hoops, 1.85c in carload lots, and 1.95c in less than carload lots,

with regular hoop card for extras. Bands, 1.50c; Bessemer steel bars, 1.50c; open-hearth steel bars, 1.50c; plow and cultivator, 1.50c, net; channels, angles, zees and tees under 3 inches, 1.60c all f. o. b. Pittsburg. The following differentials are maintained on steel: Less than 2,000 pounds, 10c advance; less than 1,000 pounds of a size, 30c advance

Merchant Steel.—The producers are still being urged for delivery and bookings of new business continue heavy, railroads being about the principal consumers. Shafting is in good demand and the whole situation is one of strength and considerable premium business is being done. We continue to quote:

Cold rolled and ground shafting, 50 per cent off in carload lots, and 45 off in less than carloads, delivered in base territory; tire steel, 1.70c to 1.80c; open-hearth spring steel, 2.25c to 2.50c; sleigh shoe flat, 1.50c to 1.55c; smooth finished machinery steel, 1.90c to 2c; toe calk, 2.05c to 2.10c. The price of planished and machine straightened tire is 1.70c base half extras as below. Iron finished tire up to 1½ inch by ½ inch, 1.65c base half extra tire list. Iron finished tire 1½ inch by ½ inch and over to be sold on regular bar basis of 1.50c base, half extra steel card.

Old Material.—The scrap market has been one of the weakest features of the market during the week, there being a general decline in prices and practically no business being done. The open winter, allowing the railroads to gather in their scrap, is blamed for the condition. Dealers, anticipating bad weather, stocked up and now have the material on their hands, and unable to dispose of it. We quote: Heavy melting stock, $16.50 to $16.75; old rails, long lengths, $17 to $17.50; No. 1 cast scrap, $15.50 to $15.75; heavy melting scrap borings, $10 to $10.25; bundled sheet scrap, $14 to $14.50; No. 1 wrought scrap, $20; low phosphorus scrap, $21.50 to $22.

Coke.—Standard Connellsville furnace coke for spot delivery is quoted $2.75 to $3, and furnace coke $2.25 to $2.40. High phosphorus coke, of which there is an immense amount offered for sale, is quoted as low as $1.40 for furnace and $2.15 for foundry. The coke market is in a decidedly weak condition and producers do not care to quote ahead. Some of the producers, in order to dispose of surplus have anticipated shipments and at some furnaces an embargo has been placed by the railroads.

Structural Material.—The curtailment of output on account of scarcity of semi-finished material has been felt to some extent in the structural mills and the leading interest, in particular, has curtailed its output in order to supply the demands on contracts for semi-finished material to outside interests. In line with the advance on plates and steel bars, the price of structural material to the Pacific coast was this week advanced to the 1.60c base, domestic users, however, not being affected. Domestic buyers, on proof of export, will receive a refund of the difference between the 1.60c base and the domestic price. The new structural mill of the Jones & Laughlin Steel Co., will be in operation about Feb. 15. We continue to quote:

Beams and channels, 15 inches and under, 1.70c; over 15 inches, 1.80c; zees, 1.70c, 1.75c; angles, from 3 to 8 inches, inclusive, 1.70c; universal and sheared plate, 6¼ inch and wider, 1.60, base.

Sheets.—Heavy tonnages, both on new business and in specifications on old contracts, continue to be booked by both the leading interest and the independent makers.

We quote: American Bessemer steel sheets, box annealed, cold rolled, one pass: Nos. 11-12, 2c; Nos. 13-14, 2.05c; Nos. 15-16, 2.10c; Nos. 17-21, 2.15c; Nos. 22-24, 2.20c; Nos. 25-26, 2.25c; No. 27, 2.30c; No. 28, 2.40c. Galvanized, Nos. 10-11, 2.35c; Nos. 12-14, 2.45c; Nos. 15-16, 2.55c; Nos. 17-21, 2.70c; Nos. 22-24, 2.85c; Nos. 25-26, 3.05c; No. 27, 3.25c; No. 28, 3.45c. Corrugated roofings, 1.70c per square for No. 28 painted, 2½-inch corrugation; 3c per square for No. 28 galvanized, 2½-inch corrugation. Quotations f. o. b. Pittsburg on large lots.

Pipes and Tubes.—While the rumor could not be traced to its source there is an intimation that within a short time bids will be asked on 12,000 tons of 16-inch steel pipe. The pipe mills are busy and the first of the new mills at McKeesport was started on Tuesday morning of this week. In proportion to other finished material the prices of pipe are lower than any other commodity. We quote:

	Steel		Iron	
Consumer's Carloads	Black	Galv.	Black	Galv.
⅛ and ¼ inch	71	55	67⅛	51½
⅜ inch	73	59	69¼	55½
½ inch	75	63	71½	59½
¾ to 6 inches	79	69	76	66
7 to 12 inches	74	59	71	55½
EXTRA STRONG PLAIN ENDS.				
⅛ to ⅜ inch	64	52	60½	48½
⅜ to 4 inches	71	59	67½	55½
4½ to 8 inches	67	55	63½	51½
Double extra strong plain ends, ⅛ to 8 inches	60	49	56½	45½

MERCHANT BOILER TUBES, CARLOADS, 22 FEET AND UNDER.

	Steel	Iron
1 to 1¼ inches	46	41
1½ to 2¼ inches	58	41
2½ inches	60	46
2¾ to 5 inches	66	53
6 to 13 inches	58	41

Less than carload lots two points less.

2½ inches and smaller, over 18 feet, 10 per cent net extra.

2¾ inches and larger, over 22 feet, 10 per cent net extra.

Rails and Track Material.—During the past week the Carnegie Steel Co., sold 12,000 tons of 60 lb., rails to a western electric road. The demand for light sections is still good. We quote: Fifty pounds and heavier, 500-ton lots and over, $28; carloads and less than 500 tons, $30; less than carload lots, $32; light rails, 16 pounds, $30; 20 pounds, $28.50 to $29; 25 to 45 pounds, $28; angle bars for standard sections, 1.50c; spikes, $2.05 to $2.10.

Billets.—On a fair sized tonnage of billets, 4 x 4 and 5 x 4, $27.75 was secured during the week, although $27.50 is more generally quoted to the trade. On a sale of Bessemer sheet bars $29 Pittsburg was done. On account of the high prices independent buyers of sheet bars are not going very far ahead of actual requirements, taking only enough to tide them over actual requirements.

Wire and Wire Nails.—An advance, above that made Jan. 8 is anticipated on wire products shortly after Feb. 1. The mills are still taxed to capacity and new business has been coming in at a highly satisfactory rate. We quote:

Wire nails, jobbers' carload lots, $1.85; retailers' carload lots, $1.90, and less than carloads, $2; painted barb wire, $2 for jobbers in carloads; retailers in carloads, $2.05, and less than carloads, $2.15, with 30c for galvanizing; plain wire, $1.70 to jobbers and $1.75 by carload.

CHICAGO.

Great Tonnage of Structural Shapes Will be Required.

Office of *The Iron Trade Review*,
1164 Monadnock Block, January 30.

By far the most important feature of the local market is the immense tonnage of structural steel that will be required this spring for building projects that are now in the hands of Chicago architects and contractors. Figures obtainable from only a few sources involve a total of 75,000 tons, three-quarters of which will be consumed in Chicago and nearby towns, and it is safe to assume there is nearly as much business pending or projected in the hands of other local contracting interests. About one-third of this tonnage is already under contract, and bids have been submitted for practically all of the remainder. The pressure to place new tonnage with mills for steel shapes is very great, and specifications are of an insistent nature.

This new construction does not take into consideration the plans of the United States Steel Corporation for the building of the steel works at Tolleston, Ind., the tonnage for which will be of stupendous proportions. The plans are yet in a tentative state, but it is reported on excellent authority, that they provide for eight modern blast furnaces, 40 to 50 50-ton open-hearth furnaces, a heavy rail mill, plate mill, structural mill and other finishing mills. At the South Chicago

works, the corporation is now building a universal plate mill, a light rail mill and a blast furnace, and it was also definitely decided last week to go ahead with the construction of the new blast furnace at Joliet. The blowing in yesterday of the idle furnace at the north works makes it the first time in several years that these two furnaces have been in operation at the same time. The Illinois Steel Co. has further increased the pig iron output.

Aside from building and agricultural material, there is little new tonnage coming forward. Bar iron has weakened $1 a ton and is now quoted at 1.75c Chicago. Scrap is also softer. Pig iron is quiet and without change in values. Tubular goods are active, and specifications for rails and track supplies are very heavy.

Pig Iron.—This market is singular in that there is neither the active demand noted in eastern centers, nor the weakness of the central west. Local interest is at low ebb, and both in trading and values the market is almost stationary. While the quietness it has assumed may reflect the belief of buyers that a decline is imminent, there is nothing from the standpoint of sellers to justify this impression. Present prices, they state, are neither fictitious nor artificial, but are the result entirely of natural causes. North and south furnaces are amply protected for the first quarter, and in many instances for the entire first half. Melters are taking the iron as fast as it is shipped and no furnace has had opportunity to accumulate any stock, except as a result of the scarcity of cars or labor, and in these instances such iron is not taken into consideration. Under these conditions, there is not the slightest disposition to shade prices, and leading southern producers are holding the higher grades firmly to the schedule based on $14.50 Birmingham for No. 2 foundry. Some gray forge iron is offered on a basis of 50 cents a ton less than this schedule, but aside from this and a few sales of analysis iron or metal high in phosphorus there have been no deviations from it in recent weeks. There is a brisk demand for high silicon irons, and southern metal running from 3 per cent to 4 per cent silicon, is offered at $15 to $15.50 Birmingham. Iron running from 1.50 per cent to 2 per cent manganese is also quoted on the same basis. Northern irons are strong at $19 furnace, or $19.25 to $19.50 Chicago for No. 2. Selling is still going on for the last half and several additional lots have been booked for this delivery. The Illinois Steel Co. will blow in this week the idle stack at its north works, and for the first time in several years the two furnaces at this plant will be in operation at the same time. It has also been definitely decided to build another furnace at Joliet, and construction work on it is to be pushed with all speed. The local foundry trade will not benefit by this additional output, however, as the whole of it will be required in the company's steel-making operations. We quote as follows:

Lake Superior charcoal	$20.50 to 21.00
Northern Foundry No. 1	19.75 to 20.00
Northern Foundry No. 2	19.25 to 19.50
Northern Foundry No. 3	18.75 to 19.00
Northern Scotch Foundry	19.75 to 20.00
Ohio Strong Softeners No. 1	20.30 to 20.80
Ohio Strong Softeners No. 2	19.80 to 20.30
Southern Foundry No. 1	18.40 to 18.65
Southern Foundry No. 2	17.90 to 18.15
Southern Foundry No. 3	17.40 to 18.15
Southern Foundry No. 4	17.15 to 17.40
Southern No. 1 Soft	18.40 to 18.65
Southern No. 2 Soft	17.90 to 18.15
Southern Gray Forge	16.65 to 16.90
Southern Mottled	16.40 to 16.65
Southern Silveries (4 percent to 6 percent Silicon)	19.15 to 19.65
Jackson Co. Silveries, 6 percent = 8 to 10 percent Silicon =	22.30 to 24.30
Alabama and Georgia Car Wheel	22.65 to 23.15
Malleable Bessemer	19.50 to 20.00
Basic Iron	18.65 to 18.90

Billets and Wire Rods.—Local quotations of these products are very stiff owing to their scarcity. Only one mill has any forging billets for sale, and these are offered at a minimum of $35 Chicago. To some extent, old steel car axles are being bought as a substitute for billets, $21 to $22 Chicago being asked for same. Wire rods are quoted $36 Chicago for Bessemer, and $37 for basic.

Iron and Steel Bars.—Iron has weakened $1 a ton in the week under review and is now quoted at 1.75c Chicago. New tonnage and specifications are both light. The consumption of steel bars shows no diminution. Specifications are heavy and there is a good volume of new tonnage. We quote carload lots, mill shipments, Chicago delivery, as follows: Soft steel bars and bands, 1.66½c half extras; soft steel angles, less than 3 x 3, 1.76½c; hoops, 2.01½c base, full extras; hard steel angles, 1.70c to 1.80c. There is a good movement of material from stock and jobbers' prices are firm. We quote bar iron, 2.25c full extras; soft steel rounds and squares, 3 inches and larger, $2 per 100 pounds base; flats, 2 in. to 4 inches by 1⅛-inch and thicker, $2 per 100 pounds base; flats, 4½ inches x 5 inches and 6 inches x 5-16 inch and thicker, $2 per 100 pounds base; all ovals, half ovals and half rounds, $2 per 100 pounds base; steel bands, $1.95 to $2.00 half extras; soft steel hoops, $2.30 to $2.40 full extras. Other sizes not mentioned above, $1.85 per 100 pounds base, plus half extras.

Sheets.—There is an excellent demand for black and galvanized sheets and prices are firmly maintained. The leading producer is filled with specifications on blue annealed and American Bessemer sheets for eight weeks; on galvanized standard sizes, 96 inches and under, nine weeks' delivery is asked; and for galvanized over 96 inches, ten to twelve weeks. This condition has deflected a considerable tonnage to local independent makers and jobbers who are better able to give prompt shipments. The latter have advanced their mill quotations $1 a ton above the official schedule. We quote carload lots, black sheets, blue annealed, as follows:

Nos. 8, 9 and 10, 1.86½c; Nos. 11 and 12, 1.91½c; Nos. 13 and 14, 1.96½c; Nos. 15 and 16, 2.06½c. Box annealed, Nos. 18-20, 2.26½c to 2.31½c; Nos. 22-24, 2.36½c; No. 26, 2.41½c; No. 27, 2.46½c; No. 28, 2.56½c; No. 29, 2.71½c; No. 30, 2.81½c. Jobbers' prices are as follows: No. 10, 2.15c to 2.25c; No. 12, 2.20c to 2.30c; No. 14, 2.25c to 2.35c; No. 16, 2.35c to 2.45c; Nos. 18 and 20, 2.50c to 2.55c; Nos. 22 and 24, 2.55c to 2.60c; No. 26, 2.60c to 2.65c; No. 27, 2.65c to 2.70c; No. 28, 2.70c to 2.75c; No. 30, 3.15c to 3.20c;

Quotations on galvanized shipments, carload lots, mill shipments, are as follows: Nos. 10-11, 2.51½c; Nos. 17-21, 2.86½c; Nos. 22-24, 3.01½c; Nos. 25-26, 3.21½c; No. 27, 3.41½c; No. 28, 3.61½c; No. 29, 3.86½c; No. 30, 4.11½c. From store, galvanized sheets are quoted as follows: Nos. 10 to 20, 3c to 3.10c; Nos. 22 and 24, 3.15c to 3.25c; No. 26, 3.35c to 3.45c; No. 27, 3.55c to 3.65c; No. 28, 3.75c to 3.85c; No. 30, 4.95c to 5c.

Plates.—Independent mills are pressing consumers in this territory for specifications. These are not coming forward in the same proportion as for other materials, although contracting for new wants continues of satisfactory volume. Deliveries are now offered within one week from date of placing orders. Prices remain firm despite the slight demand. We quote mill shipments, Chicago delivery, as follows: Tank steel, ¼ inch and heavier, up to 100 in. wide, 1.76½c base; flange steel, 1.86½c base; marine steel, 1.96½c base; all full extras. Plates 3-16 inch thick, $2 extra; gauges, 7 to 8, $3 extra; No. 9, $5 extra. Less than carload lots, $5 extra. Store prices are very firm. We quote from local stocks; tank steel, ¼ inch and heavier, up to 72 inches wide, 2c to 2.10c; 72 inches to 96 inches wide, 2.10c to 2.20c; 3-16 inch up to and including 60 inches wide, 2.10c to 2.20c; 3-16 inch 72 inches wide, 2.35c to 2.45c; No. 8, up to 60 inches wide, 2.15c to 2.25c; flange steel, 25c extra; heads, 25c extra.

Merchant Steel.—There is a scarcity of new tonnage due to the withdrawal of the leading makers from the market. All implement and carriage manufacturers are extremely busy and specifications for material are coupled with urgent requests for early shipment. Prices are without change, mill ship-

ments being quoted as follows: Spring steel, 2.10c; sleigh shoe, flat sizes, 1.71½c; concave and convex, 1.86½c; cutter shoe, 2.35c to 2.40c; smooth finished machinery steel, 1.91½c; smooth finished tire, 1.86½c base; plow steel, 2.20c and upward, according to quality; toe calk steel, 2.21c; railways spring, 1.86½c. Cold rolled shafting, 50 per cent off in carload lots and 45 per cent in less than carload lots. Crucible tool steel, 6½c to 8c; special grades of tool steel, 13c and up.

Cast Iron Pipe.—No developments of an important nature have characterized the week under review. Specifications are active and all pipe foundries are busy. The only contract of consequence pending is that of St. Paul, Minn., which involves about 1,500 tons. Prices are without change, as follows: 4-inch water pipe, $31; 6, 8, 10 and 12-inch, $30; larger sizes, $29.50; gas pipe, $1 extra.

Merchant Pipe.—Little new business is reaching mills although the open weather has resulted in an unusually heavy volume of specifications. Some inquiry has come up for line pipe for shipment to a western state, the probable tonnage of which is stated to be large. We quote carload lots, f. o. b. Chicago: ¾ to 6-inch black steel pipe, 78.35 per cent discount from list, and galvanized, 68.35 per cent. Minimum quotations from store are 76½ to 77 per cent discount on the base sizes ¾ to 6-inch black steel pipe.

Boiler Tubes.—Improved demand is noted for boiler tubes, and in the aggregate, a round tonnage has been placed in the week under review. Railroad material is especially brisk, mills being sold far ahead on these products. Official discounts are as follows:

	Steel	Iron	Seamless
1 to 1¼ inches	40.35	37.35	53.00
1¼ to 2¼ inches	54.35	39.35	40.00
2¼ inches	56.35	44.35	43.00
2¼ to 5 inches	62.35	51.35	
Up to 4¼ inches			50.50
6 to 13 inches	52.35	37.35	

Less than carload lots, from store, as follows:

	Steel	Iron	Seamless Steel
1 to 1¼ inches inclusive	40	35	42½
1¼ to 2¼ inches, inclusive	50	35	35
2½ inches, inclusive	52½	35	30
2¼ to 5 inches, inclusive	60	47½	42½

Wire Products.—Considerable new business is booked every week for all wire materials. The present demand exceeds all previous records for this period of the year, smooth wire being especially active. The open weather has induced many farmers to provide for their wants earlier than usual, and consequently jobbers' stocks are very low. The pressure for deliveries is strong, and it is literally true that the entire output of mills goes into immediate consumption. We quote carload prices to jobbers, Chicago delivery, as follows:

Wire nails, $2; painted barbed wire, $2.15; galvanized barbed wire, $2.45; smooth annealed wire, $1.85; smooth galvanized wire, $2.15; polished staples, $2.15; galvanized staples, $2.40. Carload lots to retailers, 5 cents higher than above prices; less than carload lots, 15 cents higher.

Structural Steel.—Plans and specifications are being prepared by Chicago architects and contractors for buildings to be erected this summer which will consume approximately 75,000 tons of steel. The details of these are given elsewhere in this issue. The American Bridge Co., has within the last few days closed the following contracts, through its local office: Louisville Free Public Library, Louisville Ky., 275 tons; annex to First National Bank Building, Cincinnati, Ohio, 700 tons; Drill Hall, Fort Russell, Wyo., 150 tons; finishing mill for the Santa Cruz Portland Cement Co., Santa Cruz, Cal., 275 tons. Specifications are of a very insistent nature, and there is great pressure also to place new tonnage mills.

Beams and channels, 3 to 15 inches, inclusive, 1.86½c; angles, 3 to 6 inches, 1.86½c; angles, larger than 6 inches, on one or both legs, 1.96½c; beams, larger than 15 inches, 1.96½c; zees, 3 inches and over, 1.86½c; tees, 3 inches and over, 1.91½c, with the usual extras for cutting to exact lengths, punching, coping, bending, or other shop work. Quotations on lots from store are as follows: All angles, 3 inches and larger, $2.25 per 100 pounds base; tees, 3 inches and larger, $2.30 per 100 pounds base; 3, 4, 7, 8, 9, 12 and 15-inch beams, $2.25 per 100 pounds base; 5, 6 and 10-inch beams, $2.50 per 100 pounds base; 18, 20, and 24-inch beams, $2.35 per 100 pounds base; 3, 4, 7, 8, 9, 10, 12 and 15-inch channels, $2.25 per 100 pounds base; 6 and 10-inch, 15-pound channels, $2.50 per 100 pounds base; 12-inch, 20½-pound channels, $2.35 per 100 pounds base; 5-inch channels, $2.75 per 100 pounds base.

Rails and Track Supplies.—Transactions in light rails last week aggregated a round tonnage. Deliveries on new business of this nature cannot be obtained from western mills within three months. Specifications for standard sections and track supplies are to the full capacity of mills. We quote prices f. o. b. Chicago, as follows: Heavy sections, $28; light rails, 12-pound sections $31; 16-pound, $30; 20-pound, $29; 25-pound, $28; 30-pound and heavier, $27 to $28. Track supplies, angle bars, 1.50c to 1.75c; spikes, 2.10c; track bolts, 3½ x ¾, with square nuts, $2.55 to $3.00 per 100 pounds; with hexagon nuts, $2.70 to $3.15.

Coke.—The warm weather continues a demoralizing factor in coke. Nominally, 72-hour Connellsville brands for future shipment are quoted at $3.50 ovens, or $6.15 Chicago, but trading is almost wholly confined to lots for spot delivery. These are offered at a variety of prices according to the amount of demurrage due on the cars under consideration, and sales are reported to have been made at as low as $2.50 ovens.

Old Material.—The market continues an inactive one. Old steel rails have weakened 25 cents a ton, and railroad wrought, shafting, dealers' forge, and No. 1 cast, have also declined in value from 25 cents to 50 cents a ton. Railroad offerings are growing with the prolongation of mild weather, the last list to be offered being that of the Chicago & Northwestern Railway, amounting to nearly 2,000 tons. Despite the congested stocks in the hands of dealers and mills, the C. B. & Q. list of about 4,000 tons was disposed of last week, but at prices said to be lower than any that have been realized within recent weeks. Consumers are buying only attractive lots, and as many dealers are feeling the necessity of moving at least part of their stocks, these are offered at concessions from what is considered market value. We have revised our prices, and quote gross tons in the first paragraph, as follows:

Old Steel Rails (4 feet and over)	$17.00 to 17.50
Old Steel Rails (less than 4 feet)	16.00 to 16.50
Old Car Wheels	19.00 to 19.50
Old Iron Rails	23.00 to 23.50
Relaying Rails, subject to inspection	26.50 to 27.00
Heavy Melting Steel	15.00 to 15.50
Mixed Country Steel	12.50 to 13.00

For net tons we quote as follows:

No. 1 R. R. Wrought	$17.00 to 17.50
No. 2 R. R. Wrought	16.25 to 16.75
Shafting	17.50 to 18.00
Dealers' Forge No. 1	13.50 to 14.00
Wrought Pipe and Flues	12.00 to 12.50
No. 1 Cast, 150 pounds and less	14.00 to 14.50
No. 1 Mill	9.00 to 9.50
No. 1 Busheling	12.50 to 13.00
No. 2 Busheling	12.00 to 12.50
Country Sheet	8.00 to 9.00
No. 1 Boilers Cut	12.50 to 13.00
Boiler Punchings	15.00 to 15.50
Iron Car Axles	24.00 to 24.50
Steel Car Axles	21.00 to 22.00
Iron Axle Turnings	12.25 to 12.75
Cast Borings	10.00 to 10.50
Mixed Borings, etc	10.00 to 10.50
Machine Shop Turnings	12.25 to 12.75
Railroad Malleable	15.00 to 15.50
Agricultural Malleable	13.50 to 14.00
Stove Plate and Light Cast Scrap	11.50 to 12.00
Old Iron Splice Bars	19.00 to 19.50

NEW YORK.

Business in Pig Iron of Average Good Market Volume — Inquiry Fairly Active.

OFFICE OF *The Iron Trade Review*,
ROOM 1315, No. 150 NASSAU ST., January 30.

Pig Iron.—Although there have been no phenomenally large sales, the week has been a fairly satisfactory one in the pig iron market. Inquiries are not unusually active, but transactions have been of a volume to be expected in a good, steady market. The total inquir-

ies now going the rounds are probably in excess of 20,000 tons for foundry grades. About an equal amount of basic is under negotiation and the usual tonnages of malleable, gray forge and other grades are in demand. No purchases of more than 5,000 tons have been reported. One contract for this amount of basic was placed and another for 3,000 tons of the same grade. Of malleable some 8,000 tons were accounted for, the total divided into two lots. The chief purchasers of foundry grades were the manufacturers of cast iron pipe and railroad equipment. A number of small lots of Alabama and northern iron have been sold at the prices previously quoted. Among the transactions were sales of 400 tons of No. 2 eastern Pennsylvania, 1,000 tons of Virginia, No. 2, and 500 tons of Alabama, foundry, of the same grade. The foundries in the Hudson river valley are almost without exception crowded with orders. One melter who at the beginning of the season expected to pour between 15 and 20 tons per day is melting nearly 40. There is some inquiry for shipment during the third quarter but actual transactions for delivery during that period have as yet been inconsiderable. No improvement in the supply of ferro-manganese can be noted. Shipments of ore from the Caucasus have not increased and lots of metal for early shipment easily bring from $125 to $135 per ton.

The following are prices at New York:

Northern No. 1 Foundry	$19 00 to 19 25
No. 2 Foundry	18.50 to 18.75
No. 2 Plain	18.00 to 18.25
No. 1 Southern Foundry	18.75
No. 2 Southern Foundry	18.25
No. 3 Southern Foundry	17.25 to 18.00
No. 4 Foundry	17.00 to 17.25

Pig Iron Certificates.—Trading in certificates and warrants on the New York Produce Exchange has been more active than for some weeks past. The demand for warrants has been good and a number of sales were made. On Saturday 600 tons of Alabama gray forge brought $12.25 cash. Certificates for foundry April, 100 tons and May, 200 tons were sold for $17.00. Foundry iron warrants follow:

	Bid.	Asked.
January	16.60	17.25
February	16.50	17.00
March	16.50	17.00
April	16.60	17.00
May	16.60	17.00

Finished Iron and Steel.—With the exceptional weather which has permitted out-door work without interruption the consumption of structural steel has been enormous and contractors are still turning in orders which under ordinary circumstances would be deferred until spring. Producers are in a number of cases entirely indifferent on the subject of new business, having already enough orders on the books to keep the mills busy for months to come. The pressure for new contracts comes from a variety of sources, all parts of the country being apparently similarly affected by the building boom. Owing to the indifference of the largest producers, the major share of the new business for the week has gone to independent firms. As already recorded, new buildings in this city will require not far from 100,000 tons of steel. On the Pacific coast business in sight for new building aggregates 25,000 tons including an office structure in San Francisco to be built by the Title Insurance Co. associated with the Bank of California. Chicago will need upward of 30,000 tons, including 12,000 tons for the Field Museum, and 8,000 tons for the county building. At Pittsburg two bank buildings are to be erected, the Union requiring 5,000 tons and the Commonwealth Trust Co., 3,000 tons. The activity in rails continues. The total sales for the month of January will exceed 250,000 tons. Plates have been somewhat quiet since the recent advance in prices. One producer is asking $2 per ton more than the official price, but it may be doubted whether many sales have been effected at figures higher than those established officially. The market for iron cars is a shade easier and prices are slightly lower: The following are the prices at tidewater: Angles, 3 to 6 inches x ¼ inch and heavier, 1.84c; beams, 3 to 15 inches, 1.84¼c; tees, 3 x ¼ inch and heavier, 1.89½c; plates, carloads, tank, 1.74½c; flange, 1.84½c; marine boiler, 2.04½c; refined iron bars, 1.89½c to 1.99½c; soft steel bars, 1.64½c to 1.79c; sheets, No. 28 black, 2.40c.

Old Materials.—The market has been weak by reason of large supplies, free movement from railroads and small demand. Owing to the open winter it is expected that spring supplies will be much lighter than usual. Prices are remarkably well sustained considering the light demand. The following are prices approximately f. o. b. at tidewater:

Old iron rails	$21.00 to 22 00
Old steel rails, long lengths	15.50 to 16.00
Old steel rails, short pieces	15.00 to 15.50
Relaying rails	23.00 to 24.00
Old car wheels	17.50 to 18.00
Old iron car axles	24.00 to 25.00
Old steel car axles	19.00 to 19.50
Heavy melting steel scrap	16.00 to 16.50
No. 1 railroad wrought scrap	20.00 to 21.00
Iron track scrap	17.00 to 18.00
Wrought pipe	14.00 to 15.00
Cast borings	10.00 to 10.25
Wrought turnings	14.50 to 15.50

Corrigan, McKinney & Co.'s Scottdale furnace, which has been out about a month was blown in last Thursday. The Cleveland furnace will be blown in the latter part of this week.

PHILADELPHIA.

Market Firm and Steady—Pig Iron Quotations Unchanged.

January 30.

Pig Iron.—Nothing has occurred during the past week to shake the general feeling of confidence in present and future conditions, although prices are not quotably greater. Reports of salesmen go far to confirm the general impression that stocks in the hands of consumers are very small, and as it is well known that many of these have not yet covered their requirements for the second quarter, all indications point to a firm, steady market, at least until the second half of the year. Convertible Virginia iron has been coming into the market lately on the basis of about $16.00 at the furnaces for No. 2X foundry, and some large sales of basic have been made, principally for Schuylkill valley industries that will average $18 a ton. The amount is given as from 20,000 to 25,000 tons. So insistent is the demand that even misfit irons are finding a ready sale, and it is expected that all accumulations of this kind will be pretty well cleared up during the present year. A notable feature of the orders—as for some weeks past, is that many are for comparatively small amounts—a good indication of the activity that pervades all branches of the trade, both large and small. In view of the uncertainty as to which will continue greater, production or consumption, prices are on an even keel, without a shade of weakness, they remain unchanged from last week as follows:

No 1X Foundry	$19 00 to 19 50
No. 2X Foundry	18.50 to 18.75
No. 2 Plain	18.00 to 18 25
Standard Gray Forge	17.00 to 17.50
Basic	18 00 to 18.25
Low Phosphorus	24.50 to 25.50
Southern No. 2X, rail	18.75 to 19.00

Finished Material.—So far as the market for all forms of finished products can be judged from the industries centering around Philadelphia, there is no cessation in the pressure upon the mills. Pipe foundries are much more active than for a long time, and it is needless to dwell upon the demand for structural material, plates, etc. Less talk is heard about an advance in prices, which continue unchanged as follows: Beams, channels and angels according to specifications 1.82½c to 2.50c; refined iron bars, 1.75c to 1.85c; steel bars, 1.63½c to 1.83c; plates, 1.73½ to 1.83½c.

Old Material.—Further price concessions mark the softening of the market, but scrap dealers take consolation in the thought that, while the open winter has been remarkably favorable to the free transportation of old material, this very fact is bound to prevent the slump which so often comes in the spring,

when the accumulations of months are dumped upon the market. The mills are still buying very sparingly. The following prices may be quoted:

Old steel rails	$17.75 to 18.00
No. 1 steel scrap	17.00 to 17.50
Old steel axles	21.50 to 22.00
Old iron axles	27.00 to 28.00
Old iron rails	23.00 to 24.00
Old car wheels	17.50 to 18.00
Choice scrap, R. R. No. 1 wrought	20.50 to 21.50
No. 1 yard scrap	18.50 to 19.00
Machinery scrap	16.00 to 16.50
Low phosphorus scrap	23.00 to 24.00
Wrought iron pipe	15.50 to 16.00
No. 1 forge fire scrap	16.00 to 16.50
No. 2 forge fire scrap, ordinary	13.00 to 13.50
Wrought turnings	14.00 to 14.50
Axle turnings, heavy	15.50 to 16.00
Cast borings	10.50 to 10.75
Stove plates	13.00 to 13.50

CLEVELAND.

Increasing Disposition of Buyers of Pig Iron to Defer Placing of Orders.

OFFICE OF *The Iron Trade Review*,
BROWNING BUILDING, January 31.

Iron Ore.—Occasional inquiries are coming in from eastern furnaces which have failed to cover their entire requirements until the opening of navigation, and a small tonnage is being disposed of in this direction. In the central west, however, furnaces are generally well supplied for the full winter's needs, and the movement from docks is exceedingly slow in spite of the favorable weather conditions. A number of eastern furnaces have not yet bought fully for 1906. We quote: Old Range Bessemer $4.25, Mesabi Bessemer $4, Old Range Non-Bessemer $3.70, and Mesabi Bessemer $3.50.

Pig Iron.—The more quiet tone assumed by the local market a fortnight ago continues. There is the usual run of small inquiries which generally develop into immediate business, but the aggregate tonnage is not large and includes no deals of any considerable magnitude. Foundries are melting to capacity, but for the most part their needs are covered through the first quarter and there is apparently a growing disposition on the part of purchasers to delay buying for delivery further ahead. Six weeks ago it would have been easy to sell iron for second half delivery at current quotations, but this situation no longer prevails. An incident similar to that reported last week occurred again this week when a northern Ohio interest inquired for a considerable tonnage of foundry iron. The inquiry developed a pronounced eagerness for the business, with the result that the buyer concluded to postpone placing his order. The requirements of the second quarter which remain to be filled total a heavy tonnage and very little contracting has been done for delivery later than July 1. What has been closed is at current prices and in a few instances at a slightly advanced figure. For immediate shipment Bessemer is firm at $17.50 to $17.75 for No. 2 Valley, basic is procurable at $17.25 to $17.50 and foundry No. 2 is selling at about $17.25, valley. Foundry No. 2 can be bought at $17.50 to $17.75, Cleveland furnaces, by local customers. Southern No. 2 can be secured in good amounts on the basis of $14.00, Birmingham, though a number of producers are still quoting $14.50. Consumers are asking anticipations on contracts to avoid the increased freight charges which become effective March 1, but furnaces will not be able to accede to all requests of this sort. Coke has become still weaker since our last review and sold as low as $2.15 for spot shipment of good furnace grades during the week. Contract prices are below $2.50, with spot foundry grades correspondingly low. We quote, Cleveland delivery, as follows:

Bessemer	$18.10 to 18.35
No. 1 Foundry	18.00 to 18.50
No. 2 Foundry	17.50 to 18.00
No. 3 Foundry	17.00 to 17.50
No. 2 Southern	17.85 to 18.35
Gray Forge	16.35 to 16.85
Gray Forge, Southern	15.85 to 16.35
Lake Superior charcoal	19.50 to 20.00

Finished Materials.—The structural steel for the new Hippodrome building, totaling about 2,400 tons, will be fabricated by the New Jersey Bridge Co., Manasquan, N. J., and will be erected by J. P. Cowing & Co. of this city. The contract was closed during the past week and is the heaviest in local building operations in a long time. Structural materials continue in strong demand and jobbers' stocks are being depleted in the rush to care for the unexpected spurt in mid-winter building. The mills are in better shape for plates and deliveries within six to ten weeks are procurable. Sheets are extremely active, but immediate shipments can be had from a few mills in the Pittsburg district. Bar iron has lost something of the strength it recently gained and is selling at the average price of 1.80c, though quotations continue to vary widely.

Old Materials.—The market has finally yielded somewhat to the weakening conditions which have prevailed through the winter and quotations are generally lower. Dealers, however, are not heavily stocked. Consumers are well covered and buying continues very light. We quote, f. o. b. Cleveland, as follows:

Old Iron rails	$22.50 to 23.50
Old steel rails (over 6 feet)	16.75 to 17.75
Old steel rails (under 6 feet)	17.00 to 18.00
Old car wheels	17.50 to 18.00
Steel boiler plate	14.00 to 15.00
Steel axles	21.00 to 22.00
Malleable iron (railroad)	16.50 to 17.50
Malleable iron (agricultural)	15.50 to 16.50
Heavy steel	16.00 to 16.50

We quote as follows, net tons:

No. 1 R. R. wrought	17.00 to 17.50
No. 1 busheling	14.00 to 14.50
No. 1 machine cast	13.75 to 14.25
Iron axles	23.00 to 24.00
Axle turnings	11.50 to 12.50
Wrought turnings (free from cast)	11.00 to 12.00
Grate bars	10.00 to 10.50
Pipes and flues	13.50 to 14.50
Tank iron	11.00 to 11.50
Hoop and band iron	8.00 to 9.00
Sheet iron	7.00 to 8.00
Wrought drillings	11.00 to 12.00
Stove plate	11.00 to 11.50
Cast borings	8.50 to 9.00

CINCINNATI.

Market Quiet and Iron More Freely Offered at $14.

January 30, 1906.

Pig Iron.—The developments of the past week afford but little in the way of interest, as there has been an unusually quiet market. No reported sales of sufficient magnitude to make them worthy of mention came to light. The trade is mainly concerned as to the outlook for the future. There is no defined attitude on the question of how far buyers are covered for their second quarter requirements and on this element in the situation depends the future of pig iron prices. The continued lack of interest on the part of buyers has imparted an easy tone to the situation and southern pig iron is offered at $14.00 Birmingham for No. 2 foundry with more freedom. A few of the southern makers that have been holding at $14.50 have receded from this position within the week, although 3 of the largest producing companies are still maintaining their asking price at $14.50 Birmingham. On the lower grades it is believed that concessions can be obtained, as there appears to be an abundance of offerings of low grades of southern irons. It is intimated that $12.50 Birmingham can be done on gray forge. The weakness in the scrap iron situation is not regarded with alarm, as it appears to be an accepted belief that dealers have realized on their holdings of cheap scrap and the apparently free offerings now coming out indicate that dealers are buying and selling, not caring to accumulate stock at the present level of quotations. Traveling men report continued heavy consumption and foundries busy. There are but few requests to hold up shipments and as there has been no serious complaint as to lack of transportation facilities this winter, it is a reasonable assumption that consumers have melted well up to expectations. In some quarters there is confidence that by the first of March a good buying movement may be expected to develop, as by that time it is claimed many consumers will have only 30 day's supply of iron bought, and will be ready to provide for their requirements over the second quarter of the year. We quote f. o. b. Cincinnati:

Southern Foundry No. 1	$17.25 to 17.75
Southern Foundry No. 2	16.75 to 17.25
Southern Foundry No. 3	16.25 to 16.75
Southern Foundry No. 4	15.75 to 16.25
Southern Foundry No. 1, soft	17.25 to 17.75
Southern Foundry No. 2, soft	16.75 to 17.25

Gray Forge	15.25 to 15.75
Northern Foundry No. 1	19.15 to 19.65
Northern Foundry No. 2	18.65 to 19.15
Northern Foundry No. 3	18.15 to 18.65
Jackson County Silvery, 8 per cent	20.15 to 20.65
Southern Charcoal	19.75 to 20.25

Finished Material.—The market continues firm and the jobbing trade is fairly active. Bar iron is quoted at 1.80c to 1.85c and the recent advance in sheets is well sustained. We quote: steel bars at 1.63c, half extras with dealers quoting 1.85c for iron and steel out of store. Galvanized sheets, No. 10 and No. 12, in car lots are 2.58c. We quote black sheets, No. 27 at 2.40c in car lots of 500 bundles. Black sheets out of store are selling as follows: No. 28, 2.85c; No. 27, 2.75c; No. 16, 2.35c; No. 14, 2.25c; No. 12, 2.15c. Tank plates are firm and sell out of store at 2.10c for ¼-inch and 2.10c for 3-16, Nos. 8 and 10. Beams and channels are quoted at 2.35c to 2.60c from stock and angles at 2.10c to 2.15c for base sizes.

In merchant pipe trade is fairly active with prices showing a strong undertone. We quote f. o. b. Cincinnati as follows: (quotations on wrought iron pipe obtainable only on submitted specifications and subject to ability to furnish.)

MERCHANT PIPE.
(Basing Discounts)

	Steel Pipe		Guaranteed Wrought Iron Pipe	
	Black Per cent	Galv. Per cent	Black Per cent	Galv. Per cent
⅛ and ¼ inches	69.7	58.7	....	....
⅜ inch	73.5	61.3	....	....
½ inch	73.7	61.7	....	....
¾ to 6 inches	77.7	67.7	....	....
7 to 12 inches	72.7	57.7	....	....

Coke.—The continued open weather has resulted in freer offerings and easier quotations on prompt shipment coke. There is practically no contracting. Foundry coke is relatively easier than furnace coke. The market is dull for all grades. Quotations at the principal coke producing districts are as follows:

†Wise County, Va. Furnace Coke prompt shipment	$2.50 to 2.75 per ton
Wise County, Va. Foundry Coke prompt shipment	2.75 to 3.00 per ton
Pocahontas Furnace Coke on contracts	2.50 to 2.75 per ton
Pocahontas Foundry Coke on contracts	2.75 to 3.00 per ton
Connellsville Furnace Coke prompt shipment	2.50 to 2.75 per ton
Connellsville Foundry Coke prompt shipment	2.75 to 3.00 per ton
New River Foundry Coke on contracts or prompt shipment	2.75 to 3.00 per ton
New River Furnace Coke, prompt shipment	2.50 to 2.75 per ton

†Wise County, Va., Coke on Furnace contracts is sold mainly on a sliding scale basis for pig iron prices on the following basis: $1.65 per ton on $9.00 pig iron, plus 17 per cent of the advance on pig iron above $9.00 Birmingham

Old Material.—The recent developments and freer offerings appear to be in the line of profit taking by dealers on their low price purchases and at present most dealers are handling scrap quickly and not storing at present prices. This gives the situation an apparent activity, but an easy tone, as dealers are said to be trading on close markets. The following quotations represent dealers' prices, although the market is unsettled.

Old No. 1 railroad wrought, net tons	$17.50 to 18.00
Cast machine and foundry, net tons	14.00 to 14.50
Old iron rails, gross tons	24.00 to 25.00
Old steel rails, gross tons	16.50 to 17.00
Old short lengths, gross tons	17.50 to 18.00
Old iron axles, net tons	23.50 to 24.00
Stove plate, net tons	10.50 to 11.00
Wrought turnings, net tons	11.00 to 12.50
Cast borings, net tons	9.00 to 9.50
Car wheels, net tons	16.50 to 17.00

BIRMINGHAM.

Southern Producers Slow to Admit that Lower Prices Are Made.

Birmingham, Ala., Jan. 29.—Alabama pig iron manufacturers do not admit that there are any signs of a weakening market and while there is no denying that a little iron might have been sold recently below $14.50 per ton, No 2, foundry, basis, they say that the sales were in case of lots more than 1,000 tons. The greater portion of the iron being sold in this section is in 200, 300 and 500-ton lots and this has been going out at $14.50 per ton, No. 2 foundry basis. It is announced that there is no spot No. 2 foundry iron at any price. The sales, though in small lots, have been steady, during the past week and all furnace companies announce that they have booked business right along and that present conditions are favorable. There is a good inquiry for iron in this district and it is believed that this inquiry will develop into trade. The remarkable consumption of iron through the winter has kept up with the production which has not been disturbed in the least by weather conditions. The pig iron shipments from the Birmingham district are phenomenal. Every effort is being given to get out as much iron as possible before March 1, when the advance in railroad rates on iron and similar commodities goes into effect. The furnace yards are beginning to show signs of becoming bare and it is believed that before the end of the coming month, despite the fact that the month is a short one, many orders will have been caught up with. Some of the furnace companies are behind in their orders. The railroad car shortage is being felt as well as a locomotive power shortage.

The steel market shows no signs whatsoever of weakening and the production is holding up well.

There is a strong demand for cast iron pipe and soil pipe and all industries manufacturing these goods are as active as they can be, shipping the product almost as fast as they are manufacturing it.

Four blast iron furnaces in the Birmingham district are almost ready for the torch and before the expiration of another month all of them will be making iron.

The Metal Market.

NEW YORK.

OFFICE OF *The Iron Trade Review*,
ROOM 1315, No. 150 NASSAU ST., January 30.

Pig Tin.—There has been a fair demand and the market is steady although the tendency has been downward. Today's quotations follow: Spot 36.20 to 36.50; January, 36.20 to 36.50; February, 36.10 to 36.30; March, 36 to 36.25; London, £164 5s spot and future; arrivals for the month to date, 3,665; afloat, 4,215.

Copper.—The volume of business in refined copper has been light but the decline seems to have been arrested. The market is dull and nominal. Today's closings follow: Lake and electrolytic, 18 to 18¼; casting, 18 sellers; London's closing today: £78 10s and £77 12s 6d. Exports for the month to date, 12,878 tons.

Lead.—The local market has been slow and easier with lower prices in the west and abroad. Today's closings: 5.70 to 5.80; St. Louis, 5.55; London, £16 17s 6d.

Spelter.—Refined spelter has been weak and lower. Today's closing, 6.20 to 6.30; St. Louis, 6.00; London, £27 12s 6d.

Antimony.—No material change has occured. Cookson's and Hallett's 14½c to 15c and other grades, 13¾c to 14½c.

CHICAGO.

OFFICE OF *The Iron Trade Review*,
1164 Monadock Block, January 30.

Trading in metals is light and current orders cover only immediate requirements. Prices are without material change this week. We quote lake and casting copper, 18¼c to 18¾c, Chicago, for carload lots, and 19c to 20c for smaller quantities. Pig tin, 37c to 39c, according to quantity. Spelter is without change, but firm at 6.60c to 6.90c for carloads, and 7½c to 8½c for smaller lots. Pig lead is slightly weaker, and is now quoted at 5.75c, delivered, in 50-ton lots, desilverized, and 6c to 6½c for smaller quantities. Antimony is offered at 14c to 14¼c for Hallett's and 14½c to 16½c for Cookson's, the latter being very scarce. Nickel is 50c to 65c, according to amount and deliveries.

Old metals remain soft and attractive prices are required to bring out orders. Approximate prices of local dealers are as follows: Copper wire, 15¾c per pound; heavy copper, 15¾c; copper bottoms, 15c; copper clips, 15¾c; red brass, 14¾c; yellow brass, heavy, 11¼c; yellow brass borings, 10c; red brass borings, 12½c; light brass, 8c; pipe lead, 5c; tea lead, 4½c; zinc, 4¾c; tin foil, 28c; pewter, No. 1, 23c.

MANY BUILDINGS

Will be Erected in Chicago and Vicinity in Near Future.

(Special Correspondence.)

Chicago, Jan. 30.—Among others bids have been submitted to Chicago architects and contractors on the following list of buildings which are to be erected this spring and summer. The total steel requirements of this district already approximate 75,000 tons:

Boston Store annex, 2,200 tons; Sellers Mfg. Co., Chicago, mill building, 475 tons; Board of Education for new school buildings, 750 tons; Western Steel Car and Foundry Co., Hegewisch, Ill., extensions to the plant, 1,000 tons; Big Four Railway shops, Mt. Carmel, Ill., 550 tons; Chicago Polyclinic Hospital, 275 tons; Chicago Flexible Shaft Co., addition to present building, 175 tons; New Santa Fe grain elevator, Chicago, 500 to 600 tons; Cavalry Drill Hall, Fort Des Moines, Ia., 150 tons; Shubert's Theatre, Kansas City, Mo., 600 tons; Central Building, Los Angeles, Cal., 1,700 tons; Bank of California, San Francisco, 14-story building, 3,000 to 3,500 tons; building for the Modern Order of Praetorians, Dallas, Texas, 500 tons; Santa Cruz Portland Cement Co., Santa Cruz, Cal., 1,800 tons, 275 tons of which have been let to the American Bridge Co.; Gimble Brothers' store, Philadelphia, 500 tons; Schwartzchild & Sulsberger Co., stable for new York City, 500 tons.

In addition to these is a 14-story office building to be added to Shubert's Theatre at Kansas City, when the latter is completed. The new county building of Chicago will require between 10,000 and 11,000 tons; Field Museum, about 12,000 tons, and the improvements in city bridges ordered by the Public Works Department of Chicago, about 25,000 tons, including plates.

Contracts requiring about 1,500 tons of structural steel were closed up last week by the American Bridge Company. These are as follows:

Louisville Free Public Library, Louisville, Ky., 275 tons; First National Bank Building annex, Cincinnati, Ohio, 700 tons; Drill Hall, Fort Russell, Wyo., 150 tons; Santa Cruz Portland Cement Co., Santa Cruz, Cal., 275 tons.

Club For Workmen.—The McCormick Works Club, an organization of the employes of the International Harvester Co. at Chicago, has formally occupied its handsome club house recently erected at a cost of $50,000. The building is complete in every way, with reading and recreation rooms, a well-equipped gymnasium, auditorium for meetings, dances and other entertainments, lodge halls and a number of class rooms. Expenses are paid by the annual dues of $2 and the charge of $2 for a term of 20 lessons in any one of the studies taught by competent instructors. The plan of the club home was originated by Stanley McCormick and the formal opening was postponed until his return from Europe.

BUILDING PLANS

Of the Steel Corporation at Joliet, Ill., and Tolleston, Ind.

Chicago, Jan. 30.—It has definitely been decided to proceed at once with the construction of the new blast furnace at the Joliet works of the Illinois Steel Co., and the plans are now being prepared. It will have a capacity of 450 tons a day. Plans are also in preparation for a new light rail mill and universal plate mill to be built at the south works of the company. The installation of new power equipment in the blast furnace plant at the north works, Chicago, are completed and the idle furnace there was blown in yesterday. For several years, these two furnaces have been operated alternately, but it will be possible hereafter to keep them in blast at the same time. Announcement is made on good authority that the tentative plans for the new works at Tolleston, Ind., provide for 8 blast furnaces, between 40 and 50 50-ton open-hearth furnaces, a heavy rail mill, structural mill, plate mill, and several other finishing mils. It is not expected that all these will be built at once, but provision will be made for their ultimate construction.

LATE NEW YORK NEWS.

(Special Telegram.)

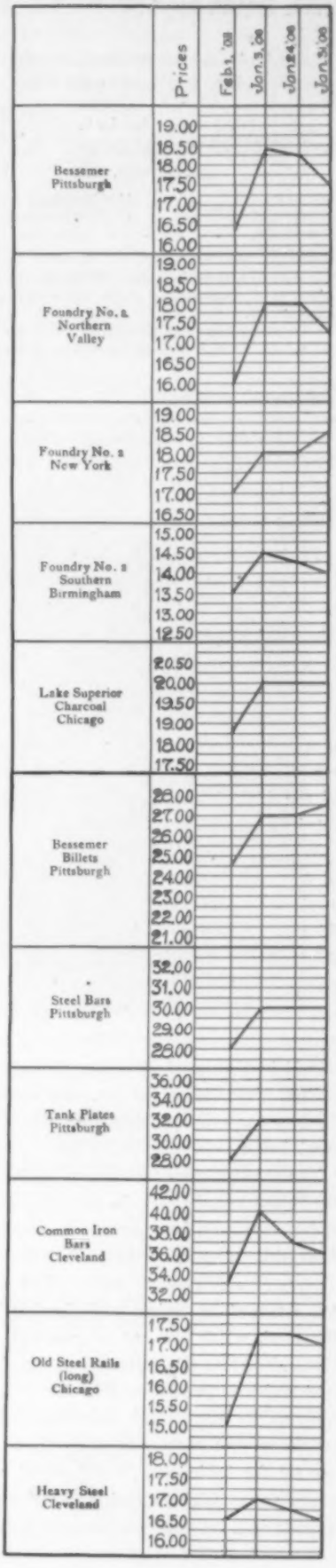
New York, Jan. 31.—The American Bridge Co. has booked an order for 9,000 tons of structural materials for saw mill construction.

An unconfirmed report states that the Lorain Steel Co. has been given the contract for 20,000 tons of rails for a tramway building in Brazil. Another report, also unconfirmed, is that the Lukens Iron & Steel Co. will supply the plates for two barges to be built at Camden by the American Shipbuilding Co.

Rail sales include the following: Pacific Electric, 12,000 tons; New York, New Haven & Hartford, 28,000; Illinois Traction lines, 8,000; Atlantic City, 5,000; Southern Pacific, 10,000 additional; scattering, 10,000 more. Large tonnages are pending.

The tonnage of materials exported by the United States Steel Corporation during 1905 aggregates 1,052,000 tons. The Export Co. is selling freely, mostly in finished products.

PRICE CHART.



THE IRON TRADE REVIEW

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February 1, 1906.

THE WORLD'S PROSPERITY.

Evidences of prosperity in the world's iron markets are given by the statistics of British iron and steel exports in 1905. The total of all iron and steel exports is 3,710,771 gross tons, a gain of nearly half a million tons over 1904, and of 150,000 tons over 1903. If complete and comparable statistics were available, it would probably appear that the exports of the United Kingdom in 1905 constituted the record.

With the United States, large exports of iron and steel products are generally a sign of adversity; with the United Kingdom they are a sign of prosperity. England's home market is her most important market, it is true, but her iron and steel export trade is the most important of any country. Her exports are so widely distributed over the whole face of the globe, being by no means confined to her colonies, that their size is a good index to world conditions.

The accompanying table shows in detail the British exports over the past three calendar years. The enumeration is different from that adopted by the United States Treasury Department, many lines being returned by weight and figuring in the total, which are not so returned in the United States, yet the rough comparison which is possible readily shows that however far the United States has passed the mother country in production, we are yet far behind her in volume of exports, as our highest total iron and steel exports in a calendar year amount to less than 1,200,000 gross tons (1904) and the less finished form in which our exports are made will probably balance the omission in our statistics of some lines which are included in the British figures, so that it can be said that American iron and steel exports have never amounted, in material importance, to one third those of England.

Our exports vary widely from year to year, partly in relation to the varying degrees of prosperity at home. England's export trade is much steadier. It is not a dumping process, but involves the careful cultivation of trade, a policy which American producers have but lately adopted. The fact that England's production goes so much to foreign countries, as a result of trade building efforts, is in a measure responsible for her steady production, the figures showing none of the wild changes so notable in American production statistics.

The United Kingdom is a heavy importer of iron and steel, as the accompanying table shows. It is to be noted that while there has been no important change in the total weight imported in the past three years, the average of these three years is about 435,000 tons, or about one-half greater than the average of the three preceding years.

This is not an unmixed evil, as the most broad minded members of the British iron trade have lately been pointing out. The brighter part of the story is that imports of crude steels have increased, and domestic makers have yet been fairly prosperous. The excess of imported billets, sheet bars, etc., has been turned into an increased tonnage of more finished products, which have been partly consumed at home and partly exported. It would be better if the steel were made at home, but it is better to finish it than not to see it at all.

It is quite remarkable that any country should in the same year import 1,364,292 tons of iron and steel, and export 3,710,-

BRITISH EXPORTS, GROSS TONS.

	1903.	1904.	1905.
Pig iron	1,065,380	810,934	981,441
Ingots, blooms, etc.	13,006	4,255	8,597
Puddled bars	12	15	429
Rails	604,076	525,371	546,644
Chairs and sleepers	45,047	56,008	78,778
Railroad (unenumerated)	71,351	73,047	80,926
Girders, beams, etc.	.....	50,205	64,225
Plates, ⅛ inch and over	119,719	108,861	147,775
Plates under ⅛ inch	42,003	43,476	56,818
Steel bars	156,821	122,930	151,809
Iron bars	128,426	115,636	134,108
Hoops and bands	45,495	40,507	41,980
Tin plates	292,800	359,634	354,951
Black plates	65,235	62,529	68,903
Galvanized and corrugated sheets	352,032	385,403	407,021
Pipe and fittings	176,443	171,092	219,223
Armor plate	1,341	5	138
Wire	59,843	60,861	81,219
Nails, screws, bolts, rivets	44,444	36,988	43,244
Wheels and axles	36,215	35,035	44,175
Wrought iron manufactures	86,193	54,869	49,208
Cast iron manufactures	61,269	48,233	41,072
Anchors, chain, etc.	25,350	26,801	28,234
Bedsteads	16,555	14,638	16,933
Unenumerated	63,545	55,464	61,830
Totals	3,564,601	3,262,797	3,710,771

BRITISH IMPORTS, GROSS TONS.

	1900.	1901.	1902.	1903.	1904.	1905.
Iron ore	6,297,873	5,546,845	6,440,317	6,313,236	6,100,556	7,350,714
Scrap	*	*	*	16,781	19,022	23,198
Pig and puddled	181,151	198,560	227,338	136,646	133,733	129,039
Crude steel	179,341	182,884	281,013	174,056	522,706	603,049
Rails	*	*	*	73,759	39,801	33,897
Wheels and axles	2,112	2,472	2,134	5,757	6,225	6,250
Structural	93,176	122,685	127,209	145,329	122,054	123,001
Plates ⅛ inch and over	*	*	*	50,329	45,693	49,079
Plates, etc., under ⅛ inch	*	*	*	21,596	22,764	19,652
Merchant steel bars	*	*	*	192,524	93,099	50,221
Iron bars, rods, etc.	80,154	98,101	172,915	186,630	104,242	105,060
Hoops and strips	*	*	*	14,106	13,226	14,678
Wire rods	*	*		20,906	24,386	44,600
Nails, bolts, screws, etc.	*	*	*	51,075	49,851	55,454
Unenumerated	225,468	264,037	229,835	131,092	113,150	105,221
Total, except ore	761,402	868,739	1,040,744	1,320,586	1,291,830	1,364,292

* Not separately stated prior to 1903.

771 tons. England is a commercial nation. Her means of communication are good. She sent in the past two years an average of more than 135,000 tons of pig iron to Germany, yet imported from Germany a large tonnage of crude steel. Last year she took from Sweden 67,175 tons of pig iron, and sent 45,817 tons of other grades of pig iron to Sweden.

While British exports of tin plate showed a decrease from 1904 to 1905 of 5,000 tons, the exports to the United States decreased by nearly 9,000 tons, so that there was a net gain of about 4,000 tons in exports to other countries. This is a trade which will doubtless increase.

ONE GREAT UNIVERSITY.

Years ago a new college could be established without the expenditure of a large amount of money, as about all the requirements were a few buildings, professors and books. Today, to establish a modern university, in which engineering courses are given, is a vastly different proposition. Salaries paid to able engineers by manufacturing concerns are so high that it becomes necessary to pay a member of the faculty of a technical school somewhere near what he could earn outside of college walls, which amount is nearly always larger than the salary ordinarily commanded by a professor teaching in a classical course. The buildings of a technical school, including laboratories with their costly equipment, are also a very important factor in the necessary expenditures in establishing a modern university.

In the state of Ohio considerable progress toward creating a university worthy of that great state has been made at the Ohio State University at Columbus. The engineering courses are thorough, and the equipment of the laboratories, while not all that might be desired, is not discreditable. The university has graduated many men who have made their mark in the engineering world. The state has, however, pursued a short sighted policy in not concentrating all its efforts on the upbuilding of one university. It has diverted a considerable part of the annual appropriation for higher education to two other so-called universities, which are not worthy of the name, located at Athens and Oxford. One of those institutions now pretends to give engineering courses, while the other is said to be preparing to announce similar courses. The absurdity of institutions of such limited resources as those at Athens and Oxford attempting to give engineering courses is apparent to any one familiar with the conditions existing at the two places. A bill is now pending in the Ohio legislature which provides for expending of all of the state funds for higher education in building up of one great university at Columbus, while such state support as may be given to the Athens and Oxford institutions will be confined to their Normal schools. Hundreds of engineers who have graduated from the Ohio State University are taking an active interest in this bill. Its passage will be a most important step in the right direction.

GREATER ORE PRODUCTION.

Official advance statements regarding the forthcoming report of Mr. John Birkinbine to the United States Geological Survey on the production of iron ore in 1905 are to the effect that when complete returns are in it will be found that production exceeded by more than 20 per cent the record of 35,554,135 tons, made in 1902. This can easily be, inasmuch as an increase of 20 per cent would mean but 7,110,000 tons, while Lake Superior shipments are already known to have increased by over 6,500,000 tons, and Mr. Birkinbine says that increased outputs are reported from the eastern states, the southern states and the Rocky Mountain region. It is interesting to note that prior to 1905 no mine had ever produced more than 2,000,000 tons of iron ore in one year, while in that year a production of 2,500,000 tons was reported from a single mining operation.

The production in the United States last year exceeded the total of the best records made by Germany and Great Britain. The state of Minnesota alone produced as much ore as did Germany, a fact which is of still more significance when the greater richness of the ore is taken into account.

An increase of 20 per cent over the record of 1902 would mean a production in the United States of say 43,000,000 tons, which would compare with previous figures as follows: 1870, 3,031,891; 1880, 7,120,362; 1890, 16,036,043; 1895, 15,957,614; 1900, 27,553,161; 1901, 28,887,479; 1902, 35,554,135; 1903, 35,019,308; 1904, 27,644,330.

COMPANY ORGANIZED

With Capital of $5,000,000 to Operate Snyder Furnace Properties.

Pittsburg, Jan. 31.—W. P. Snyder of Pittsburg, who recently acquired the Oliver interests in the Shenango furnace properties, has organized a company with a capitalization of $5,000,000, to operate these plants. At a meeting held today the following officers were chosen; W. P. Snyder, president; C. D. Dyer, vice president; Henry Irwin, secretary-treasurer; W. A. Barrons Jr., general manager; George D. Devitt, superintendent of furnaces; D. C. Peacock, superintendent of mines.

W. P. SNYDER.

The company owns four blast furnaces at Sharpsville, Pa., large ore interests in Michigan and Minnesota and large tracts of coking coal lands in Westmoreland Co., Pa., besides the Shenango Steamship Co. properties on the lakes. The ten thousand ton steel freighter, W. P. Snyder, owned by this company, will be launched in February.

Mr. Snyder has long been prominent in the iron and steel industry and is now one of the leading pig iron producers of the country, besides being interested heavily in allied lines. He leaves tonight in his private car "Rover," to spend the winter in Florida.

HEADS OF UNITED ENGINEERING & FOUNDRY CO., AT BANQUET TENDERED MR. T. J. BRAY, RETIRING CHIEF ENGINEER.

Mr. Bray sits in the second seat from the left, front row.

BANQUET TO MR. BRAY.

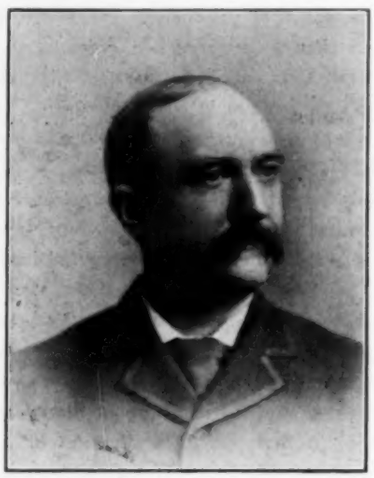
Upon the announcement of the appointment of Mr. T. J. Bray, chief engineer of the United Engineering & Foundry Co., Pittsburg, to the position of assistant to the president of the Republic Iron & Steel Co., in charge of engineering and construction work, the constituent companies of the former concern (McGill & Co., The Lloyd-Booth Co., Lincoln Fdy. Co., Frank-Kneeland Machine Co., and the Chilled Roll Foundry Co.), tendered him a complimentary banquet at the German Club, Pittsburg, as a testimonial of the esteem in which he is held by his former associates. Mr. Bray has already assumed the duties of his new position.

At the banquet there were no set speeches, the affair being entirely informal. President I. W. Frank, of the United Engineering & Foundry Co., made the principal address, reviewing the career of Mr. Bray and complimenting him upon the progress he has made in the engineering world. Those present were: I. W. Frank, C. H. Booth, E. Kneeland, C. E. Satler, T. J. Bray, J. O. Barnett, K. C. Gardner, R. H. West, F. J. Wilson, O. I. Affelder, H. A. Kelly, L. Ebinger, F. Taggert, G. G. Small, H. E. Walters, W. C. Jefferson, F. Cordes, G. W. Knotts, J. Quinn, L. Schwartz, F. C. Biggert, H. A. Grusch, G. C. Campbell, L. Voelker, R. W. Toner, J. J. McNamara, Norman W. Belleville, Chas. A. Johnson, F. I. Ellis, and G. H. Richter.

Mr. Bray will be succeeded as chief engineer by Mr. F. I. Ellis.

W. J. ISAACSON RETIRES.

Mr. W. J. Isaacson, managing director of the Dayton Coal & Iron Co., Cincinnati, Ohio, after a long business career in the iron, steel and metal trades has decided to take an extended rest from business cares and has resigned as managing director of the



W. J. ISAACSON.

company with which he has been identified since 1885.

Mr. Isaacson started in the iron and steel business in 1869 in New Haven, Ct. The business in those days was largely one of importation of iron, steel and metal. The production of pig iron in 1869 was under 2,000,000 annually, and the imports from abroad, were over 1,000,000 tons. As the business was so largely in imports, he became a partner in the firm with which he was connected and made his home in Liverpool, England, in 1871. He was in business in Liverpool until 1835, when he retired from the firm in consequence of the change which came over the trade, the United States showing ability to produce its own requirements by that time. The Dayton Coal & Iron Co. had just been formed by English and Scotch capital and he accepted the position of managing director of the company in that year and has continued in that position until this time.

In connection with the well known firm of James Watson & Co., of Glasgow, Scotland, he started the business of exporting pig iron to Europe in 1894. By the year 1896 the exportation of pig iron had assumed large proportions and continued for several years, enabling Alabama operators to prosecute operations on a large scale. This proved of great benefit to the Alabama iron trade in years of severe depression.

Mr. Isaacson has seen the growth of the production of pig iron in this country, during his business career, from an output of less than 2,000,000 tons per annum to the immense production of the present.

To THE IRON TRADE REVIEW representative, Mr. Isaacson said, "If I were to venture a forecast of the future, I would say that this country was destined to become an immense exporter of iron and steel. The world's require-

ments are constantly expanding and must depend upon this country for supplies. England has practically reached the limit of its possiblities and Germany can only increase moderately. The exportation of iron and steel products from this country are only beginning and must grow constantly as the expansion in this country is almost unlimited and the availibility of raw material here is the factor which will and does give us the position of advantage. With the world's requirements constantly increasing the raw material to meet this demand is available only in this country and this country will be called upon increasingly for iron to supply foreign requirements."

Ensley Nail Mill Burns.—The nail mill department of the plant of the Southern Steel Co., formerly the Alabama Steel & Wire Co., at Ensley, Ala., was destroyed by fire Sunday, January 28, entailing a loss estimated at more than $100,000. Machinery was badly damaged, but the wire, rod and other departments were not injured. The nail mill, which employs between 150 and 200 men, will be rebuilt with as much rapidity as is possible The mill had an anuual capacity of 1,000,000 kegs of wire nails.

The last three years have witnessed a marked advance in the preparation of the various steel-hardening metals commercially. They were formerly placed on the market almost exclusively as ferro-alloys, but with the advent of processes, as the alumino-thermit process, for reducing oxides of the metals, it became feasible to obtain most of the so-called rare metals in the free state; As a result many of the steel-hardening metals may be had on the market as metals as well as alloys. Manganese chromium, tungsten, nickel, vanadium and titanium are some of the above.

The following companies have been incorporated under the laws of Ontario:

The Sudbury Machine Shop & Foundry Co., Ltd., head office Sudbury, capital $40,000, provisional directors, David H. Haight, Alexander B. Gordon, Lawrence O'Connor, Oscar R. Smith, and John Lawson.

The Campbell & Tough Stock Scale Co., Ltd., head office Arnprior, capital $50,000, provisional directors, Duncan J. Campbell, Robert J. Tough and David Craig.

The muck mill and furnaces of the Shenango Iron & Steel Co., at Wheatland, Pa., are now in operation but the finishing mills will not be ready much before April 1.

LAKE SUPERIOR IRON MINES.

Duluth, Jan. 30.—The Volunteer mine is once more optioned and will be again developed, this time by Harry Roberts, of Duluth, who for himself and associates has made a deal with the owner, Gen. Alger, of Detroit. Roberts will attempt to prove a mine that he can dispose of at an advance over his purchase price and will get to work as soon as he can take in material and supplies.

All work of Pickands, Mather & Co. on the new Cuyuna range west of Duluth, has been stopped and the pumps have been pulled from the shaft they sank there. The results were not what they had been led to expect from drill exploration upon which they were induced to make thorough examination. It seems that in this district drill records do not hold up when checked by actual openings; drills are not always the most reliable means of getting underground samples, though frequently, as in the Mesabi range, the drills do not show qualities as good as the ore is afterwards proved to be by shafts and openings.

John T. Jones expects to ship about 30,000 tons of lean Bessemer ore from a Cascade range mine which he has been exploring since last summer, and will get tracks in at once.

Shenango mine of the Shenango Furnace Co., is developing with much rapidity, in order to mine this year about 500,000 tons, which will be more than twice as much as in any previous year. The same company is operating the Webb mine, near Hibbing, and may get out 200,000 tons, but scarcely hopes to make as much the second year. The Webb shipped this year 71,000 tons. The Shenango has never mined up to the minimum for which it has paid, and this year expects to more than clean up the ore it has already paid for.

A NOTEWORTHY CATALOG.

Joseph T. Ryerson & Son, Chicago, have just issued at catalog which sets a high water mark in trade literature. Not only from a typographical standpoint is it deserving of commendation, but it is particularly praiseworthy for the many original ideas shown in its construction. Nearly two years were spent in its preparation and the result fully justifies the effort. Its numerous tables of the weights and dimensions of rolled iron and steel stock and other information of kindred character, as well as its illustrations and descriptions of iron working tools and machinery make it an invaluable publication to all users of these products. The book is 11½ inches long, by 9 inches wide, with a flexible morrocco leather binding which can readily be removed to permit of the removal or insertion of extra pages. The loose leaf system was adopted that the contents might easily and inexpensively be kept up to date. From time to time, as the warehouse stocks of iron and steel change, and other tools are added, pages describing these changes will be mailed for insertion in the book.

With but few exceptions, the cuts are new and were prepared especially for this catalog. The type is also new and of tasteful design, while the paper is of heavy coated stock. Vignetted views of the large tonnage of iron and steel stored in the company's warehouses give an idea of its resources in this direction, each department of the book's contents being followed by a blank page containing one of these cuts. Linen finger references extend from the pages, and access to the contents is further facilitated by an alphabetical index in which every tool and machine listed is mentioned several times under the various names by which it is known.

As a reference work, the catalog is deserving of special mention. Tables of weights and dimensions of steel I beams, angles, channels and Z bars are given, together with the variation in cutting to lengths of these and other structural materials. In the department devoted to steel plates is given the standard list of extras; a table of weights of circular boiler heads; the extras for shearing, punching, flanging and for otherwise preparing the material to the buyer's specifications. Tables showing the estimated weights of black, galvanized and corrugated sheets are included, and similar complete and useful information is also given of iron and steel bars, bands and hoops, and the other metal products handled by this company. The line of iron working tools and machinery cataloged includes almost everything required in the fabrication of finished iron and steel, each of the four powers being represented in this equipment.

The Westinghouse Machine Co., East Pittsburg, has just installed a new 3,040-horsepower power house boiler plant, together with a complete coal and ash handling equipment and water filteration plant.

The Becker-Brainard Milling Machine Co., Hyde Park, Mass., is distributing an extremely useful wall calendar. It is severely plain, but the type is large and clear, and can easily be read across the room.

The plant of the Bellefontaine Bridge & Iron Co., Bellefontaine, O., was destroyed by fire Jan. 29, the loss incurred being about $50,000. The fire originated in the blacksmith department.

THE BESSEMER PROCESS IN THE UNITED STATES.

The recent occurence of the semi-centennial of the invention of the Bessemer process justifies the following compilation from James M. Swank's "Iron in All Ages," of the history of the introduction of the process into our own country. Mr. Bessemer's first public account of this invention was read by him at the annual meeting of the British Association for the Advancement of Science, at Cheltenham, in August, 1856. It was entitled: "On the Manufacture of Malleable Iron and Steel without Fuel," but his first English patent in connection with his great invention was granted on Oct. 17, 1855. In 1856 he patented his invention in the United States, but he was at once confronted with a claim of priority of invention by William Kelly, of Eddyville, Kentucky, which was allowed by the Commissioner of Patents.

As early as 1861, Captain E. B. Ward of Detroit, and Z. S. Durfee, of New Bedford, obtained control of the patents of William Kelly, who had previously successfully experimented with the pneumatic process at Eddyville, where he owned the Eddyville Iron Works. In 1861 Mr. Durfee went to Europe to study the Bessemer process. During his absence, Capt. Ward invited William F. Durfee, also of New Bedford, and a cousin of Z. S. Durfee, to erect an experimental plant at Wyandotte, Mich., for the manufacture of pneumatic steel, and this work was undertaken in the latter half of 1862.

In May, 1863, Daniel J. Morrell, of Johnstown, and William M. Lyon and James Park Jr., of Pittsburg, having become partners of Captain Ward and Z. S. Durfee in the control of the patents of Mr. Kelly, the Kelly Pneumatic Process Company was organized, Mr. Kelly retaining an interest in any profits which might accrue to the company. It was resolved to complete the experimental works already undertaken and also to acquire the patent in this country of Mr. Mushet for the use of spiegeleisen as a recarburizing agent. This patent was granted in England in 1856 and in this country in 1857. Mr. Z. S. Durfee accordingly went to England to procure an assignment of Mr. Mushet's patent. The latter purpose was effected on the 24th of October, 1864, upon terms which admitted Mr. Mushet, Thomas D. Clare, and John N. Brown, of England, to membership in the Kelly Process Company. On September 5, 1865, the company was further enlarged by the admission to membership of Charles P. Chouteau, James Harrison, and Felix Valle, all of St. Louis. In September, 1864, William F. Durfee succeeded in making Bessemer steel at the experimental works at Wyandotte. This was the first Bessemer steel made in the United States. A part of the machinery used at the Wyandotte works was an infringement upon Mr. Bessemer's American patents.

The control in this country of Mr. Bessemer's patents was obtained in 1864 by John F. Winslow, John A. Griswold, and Alexander L. Holley, all of Troy, New York, Mr. Holley visiting England in 1863 in the interest of himself and his associates. In February, 1865, Mr. Holley was successful at Troy in producing Bessemer steel at experimental works which he had constructed for his company at that place in 1864. Mr. Mushet's method of recarburizing melted iron in the converter was used at Troy, and this was an infringement upon his patent in this country.

As the Kelly Process Company could not achieve success without Mr. Bessemer's machinery, and as the owners of the right to use this machinery could not make steel without Mr. Mushet's improvement, an arrangement was made by which all the American patents were consolidated early in 1866. Under this arrangement the titles to the Kelly, Bessemer and Mushet patents were vested in Messrs. Winslow, Griswold, and Morrell, the first two being owners of seven-tenths of the property and Mr. Morrell holding the other three-tenths in trust for the Kelly Process Co. This arrangement continued until the formation of the Pneumatic Steel Association, a joint-stock company organized under the laws of New York, in which the ownership of the consolidated patents was vested. Z. S. Durfee acted as the secretary and treasurer of the company. The ownership of the patents was afterwards vested in the Bessemer Steel Company Ltd., an association organized in 1877 under the laws of Pennsylvania. This association was succeeded by the Steel Patents Company, organized in 1890. All the original English and American patents have expired.

William F. Durfee has described in the following words the quality of the Bessemer steel first made at Wyandotte: "Various experiments were tried to test the ductility and working qualities of the steel produced at Wyandotte. Some of the early product was sent to Bridgewater, Massachusetts, and there rolled into tack plate and cut into tacks which were pronounced to be very much superior to any previously made of iron. In order to test the welding qualities of the steel John Bishop, the blacksmith of the works, made a tobacco-pipe the size of an ordinary clay pipe, the bowl and stem of which were welded up of Wyandotte steel, and when perfectly polished there was no visible evidence of a weld. I have now two jackknives and a razor made from this steel; the knives are rather soft, but the razor was used regularly by my father for fifteen years to his entire satisfaction."

The consolidation in 1866 of the various interests above mentioned was followed by a large reduction in fees and royalties, and thenceforward the business of making Bessemer steel was rapidly extended in this country, although it is a remarkable fact that from 1876 to 1881 no Bessemer steel works were established in this country. Beginning with the latter year many Bessemer works have been built in the United States, but these we need not mention.

Robert W. Hunt informs us that the first Bessemer conversion made at Troy was from Crown Point charcoal pig iron, melted in a reverberatory furnace, and William F. Durfee informed us years ago that the first steel made at Wyandotte was converted from Lake Superior charcoal pig iron, also melted in a reverberatory furnace, although on a number of subsequent occasions the metal for conversion was taken directly to the converter from the Eureka charcoal blast furnace at Wyandotte.

It is supposed that the first attempt made in the world to melt pig iron in a cupola for conversion into steel by the Bessemer process was made by Z. S. Durfee at the works at Wyandotte during the spring of 1865. This attempt failed of success owing to the small size of the cupola and the length of time required to accumulate enough iron in the traveling ladle for use in the converter; but the subsequent general employment of the cupola whenever pig iron was used for conversion into Bessemer steel is sufficient evidence that the thought which prompted this first experiment had a substantial and practical foundation. Mr. Hunt states that on July 20, 1865, Mr. Holley successfully used the cupola at Troy in connection with the Bessemer process. The English practice at this time was to use the reverberatory furnace.

The first Bessemer steel rails ever made in this country were rolled at the North Chicago rolling mill on the 24th of May, 1865, from ingots made at the experimental steel works at Wyandotte under the supervision of William F. Durfee, superintendent. The rolls with which the steel rails were rolled at the North Chicago rolling mill had been in use for rolling iron rails. The steel rails came out sound and well-shaped. Several of these rails were laid in the

track of one of the railroads running out of Chicago and were still in use in 1875. The American Iron and Steel Association was in session at Chicago at the time, and several of its members witnessed the rolling of the rails.

The first steel rails ever rolled in the United States upon order, in the way of regular business, were rolled by the Cambria Iron Company, at Johnstown, Pennsylvania, in August, 1867, from ingots made at the works of the Pennsylvania Steel Company, near Harrisburg, Pennsylvania, and by the Spuyten Duyvil Rolling Mill Company, at Spuyten Duyvil, New York, early in September of that year, from ingots made at the Bessemer steel works at Troy, New York, then owned by Winslow & Griswold.

Important improvements upon Mr. Bessemer's machinery were soon invented and patented by A. L. Holley, Geo. Fritz, Robert W. Hunt, William P. Jones, and other American engineers. Of these improvements the most notable is the Fritz blooming mill, which is in general use in this country and in Europe. The largest number of improvements were made by Mr. Holley. The inventive genius and rare mechanical skill of John Fritz, of the Bethlehem Iron Company, have also produced many valuable improvements which were clearly patentable but were not patented.

In the early stages of the Bessemer steel industry in this country great difficulty was experienced in obtaining suitable pig iron and also materials for the lining of the converters. Large quantities of Bessemer pig iron were annually imported. Our manufacturers were uncertain whether American ores would make good Bessemer pig iron, and many failures occurred in using domestic pig iron that was unsuited for conversion into steel. The lack of skilled workmen was also severely felt. All difficulties, however, have long been overcome. It is now universally admitted that in the United States this industry has been brought to a higher state of perfection than it has attained in any other country. The American Bessemer steel works have been constructed after plans which are in the main greatly superior to those of European works. The United States is now not only independent of other countries for its supply of Bessemer pig iron but it is also the largest producer of Bessemer pig iron in the world.

The establishment of the Bessemer steel industry in many countries is justly regarded as constituting a much more important revolution in the production and use of iron and steel than had been created by any preceding influence or combination of influences in any age of the world's history. And yet this great industry did not for many years after it was established in Europe attract the attention either on that continent or on this which its importance deserved. In his report on the Paris Exposition of 1867 the Hon. Abram S. Hewitt said: "In view of the small amount of Bessemer steel as yet produced in the United States we are struck in Europe with surprise at the enormous provision made for its supply; and it is quite evident that the business is overdone, and, contrary to all past experience, the inventor and the public at large seem to have profited by its introduction at the expense of the manufacturer."

PROMOTIONS ANNOUNCED.

Oliver Iron Mining Co. Makes Important Changes In Its Official Staff.

(Special Correspondence.)

Duluth, Minn., Jan. 29.—When President Cole, of the Oliver Iron Mining Co. returned to this city, on Saturday, he announced changes in management of the company as follows:

To be vice president, W. J. Olcott, who is relieved of a portion of his work as general manager and given a more purely executive position.

To be general manager, P. Mitchell, formerly this company's manager in the Hibbing district.

To be assistant general manager, J. H. McLean, formerly the company's general superintendent of the Gogebic range.

To be manager of the Hibbing group, Wm. J. West, formerly assistant manager there.

To be general superintendent Gogebic range, O. C. Davidson, who has been, and continues to be, general superintendent for the Menominee range.

To be superintendent for the Gogebic range, D. E. Sutherland, formerly assistant.

These changes are, in every instance, promotions of the men next in line, and are received with expressions of pleasure by all those who know the men.

All ore in stock at old Magnetic mine, near Republic, is being hauled out to the railroad and will be shipped to furnaces as a trial of the property. Pickands, Mather & Co. have an option on the old mine and want to try its low grade ore in the furnace before doing much work there.

A few days ago, while driving the interlocking steel piling for the New Syracuse shaft through quick sand, one of the steel sections hit a boulder. Drill holes had been driven down to ledge around the entire periphery of the shaft and no boulders had been hit, but it is evident that one or more of the drill holes had become deflected. After a week of careful and difficult work the boulder was got out of the way and the driving down of the piles proceeds. These piles are steel channels and the interlocking is by means of Z bars riveted on every other beam. They are driven down between an inner and outer timber shaft, that had been sunk to water level and will keep on till ledged, when the quick sand inside will be excavated and the inner timber skin continued down as the shaft-lining. The system is new to Lake Superior, and is looked on with much favor. It cannot be worked in ground full of boulders.

Drills are employed in 59-14 at the old Mallman, and by the Great Northern Exploration Co. in 22. In this town, too, the small Mayas deposit is being stripped, and Jos. Sellwood is sinking a shaft on a small ore body in 30. Several drills are being taken into Town 60-12 for George St. Clair.

Of the 985 men employed at Chapin Mine, Iron Mountain, all but 3 are of foreign birth. These are as follows: Italy 314; Scandinavia 291, England 154, Austria 79, Germany 78, Canada 24, Finland 19, Ireland 15; others scattered.

The Hanna Engineering Works, Chicago, is distributing to its customers and friends a very tasteful and neat reminder of its pneumatic shakers and riveters. This takes the form of an office thermometer, fastened to an aluminum plate, 6½ x 5 inches, on which are etched half-tone illustrations of the various types of these machines made. It is an effective departure from the usual methods of supplemental advertising.

Work will start in the next few days on the erection of the big machine shops and foundry to be erected by Payne & Joubert, at East Birmingham. As has been stated before, this plant will manufacture sugar machinery to a considerable extent, in addition to conducting a general casting business.

The Railway Appliances Co., Chicago, has purchased the interests of Pedrick & Ayer, formerly of Philadelphia but now located at Plainfield, N. J., and will operate their plant in the future.

The Parkhurst Mfg. Co., Peru, Ind., has started its new foundry and has installed a No. 60 Newton cupola and a Northern crane made by the Northern Engineering Works, Detroit, Mich.

PERSONALS.

Andrew Carnegie has given $50,000 to Mt. Union College.

Samuel Mather, of Pickands, Mather & Co., Cleveland, sailed last week for Europe.

George B. Woomer has been appointed receiver for the Lebanon Foundry Co., Lebanon, Pa.

A. M. Flora has been elected secretary of the Columbus Iron and Steel Co., succeeding W. W. Marting.

W. L. Brown, president of Pickands Brown & Co., Chicago, has left for a three-months' sojourn in California.

George Westinghouse, of Pittsburg, has been awarded the John Fritz Gold Medal for his invention of the air brake.

J. A. Hatfield, president of the American Bridge Co., of New York, sailed for Europe Tuesday on the steamship Moltke.

Joseph H. Glidden of DeKalb, Ill., famed as the inventor of the barbed wire fence, recently celebrated his 93rd birthday.

Frank E. Marcy, district manager of the Salt Lake City branch of the Allis-Chalmers Co., has moved his offices to the Dooly Bldg., 117-19 East Second South street.

A. H. Warren, brother of H. B. Warren, formerly president of the Allis-Chalmers Co., has resigned his position at the head of the company's publicity department.

Jerome Keeley Jr., formerly superintendent of the DeBar, DeLeben furnace at Bessemer, Ala., has taken service with the Cincinnati agency of the Tennessee Coal, Iron & Railway Co.

Henry C. Hunter has been appointed deputy commissioner of the recent amalgamated of the New York Metal Trades Association and the National Metal Trades Association.

G. B. Waterhouse has associated himself with the Lackawanna Steel Co., Buffalo, N. Y., to write for them on the subject of metals, resigning his position as assistant professor of metallurgy at Columbia College.

L. Cummins will have charge of the branch office which the Abner Doble Co. has opened at 447 Pacific Electric Bldg., Los Angeles, Cal. He will cover Southern California, Arizona, New Mexico and parts of Nevada and Mexico.

Colin M. Ingersoll Jr., has been appointed chief engineer of the New York department of bridges. He will succeed O. F. Nichols who will remain with the department as consulting engineer. Mr. Ingersoll has been connected with the New York, New Haven & Hartford Railroad, and was chief engineer of that line from April, 1900 until October last. He is a native of New Haven, is forty-eight years old, and is a graduate of the Sheffield Scientific School of Yale University.

J. W. Harrison, for eight years superintendent and manager of the plant of the National Car Coupler Co., at Converse. Ind., has been elected president and general manager of that company. He succeeds to the position of Frank Nowak, resigned.

L. W. Powell, retiring assistant general manager of the Oliver Iron Mining Co. and vice president of the Pittsburg Steamship Co., was banquetted by his associates at the Kitchi Gammi Club, Duluth, Jan. 20, when a formal leave-taking was made. His duties in connection with a group of copper mines at Bisbee, Ariz., begin Feb. 1.

W. H. Marshall, general manager of the Lake Shore Railway, according to persistent reports, has been tendered the presidency of the American Locomotive Co. and will probably accept. He is one of the best known mechanical men in the railway world, having been especially successful as a designer of the larger and speedier types of locomotives.

The Association of American Steel Manufacturers recently elected Jesse J. Shuman, chief inspector of the Jones & Laughlin Steel Co., Pittsburg, secretary and treasurer. At the meeting held in Pittsburg, Jan. 20, the members of the association presented Albert Ladd Colby, the retiring secretary who has served in that office for the past nine years, with a handsome silver set. Mr. Colby tendered his resignation as the result of his going into business as consulting engineer.

AVERAGE CARGO INCREASES.

The average cargo of iron ore taken from the docks of the Duluth, Missabe & Northern road last year amounted to 6,101 gross tons. This is to be compared with an average for 1895 of 1,800 tons. There has scarcely been a single year since the beginning of traffic by that road when its average cargo load has not shown an increase. It is probable that with the great number of large ships now under way at lake yards, the average for 1906 will be in the neighborhood of 6,500 tons, for the largest of the lake fleet is trading to the docks of this company.

The new coke plant in the Connellsville region of the Struthers Furnace Co., Cleveland, is in sucessful operation. The slag cement plant, with capacity largely increased by the installation of additional machinery, will be started again next week.

OBITUARIES.

Frank E. Davis, superintendent of the blooming mill of the Newburg works of the American Steel & Wire Co., Cleveland, died of pneumonia, Jan. 19, at the age of 29 years.

Henry C. Fish, Worcester, Mass., a pioneer in the machine tool business, died Jan. 15, at the age of 81 years. He was actively connected with the L. W. Pond Machine & Foundry Co. when that company was first formed and later established his own machine shop, known as the H. C. Fish Machine Works. He leaves a widow, two daughters and a son, Elmer C. Fish, an instructor at the Washburn shops of the Worcester Polytechnic Institute.

Frederick B. Burkhardt, a pioneer foundryman of Cincinnati, died Jan. 25, at the age of 77. He was born in Alsace, coming to America when very young, and serving as an apprentice at the Niles foundry, where he rose to the position of superintendent, which he resigned to associate himself with the Greenwald foundry. He superintended the construction of a number of the monitors for the United States government during the Civil War, after which he engaged for a time in locomotive building. He was a member of the firm of Fritsch, Burkhardt & Co., founders and machinists, but abandoned that business to devote himself to mercantile pursuits.

NEW RIVET PLANT.

The Champion Rivet Co., Cleveland, O., well-known as a manufacturer of boiler and structural rivets, has purchased a tract of 25 acres on the Erie Railroad, Cleveland, and is preparing plans for factory buildings of the most modern design to be erected during the coming spring. These buildings will be equipped with machinery which ten years of experience has taught the company to be best suited to its work. Included in this will be ten machines in addition to those now in use, increasing the output of the plant from 100 to 200 tons per day. In 1895 the company turned out one ton per day; when the new buildings are completed it will have what is pronounced the largest plant in the world devoted exclusively to the manufacture of rivets. It makes a specialty of rivets one-half inch in diameter and larger.

The Westinghouse Electric & Machine Co. has booked orders for 47 electric mine locomotives, of which eleven were ordered by the Oliver Iron & Mining Co., five for the British Columbia Copper Mining Co. and other by the Bishoff Tin Mining Co. of Melbourne, Australia.

A LARGE BRITISH ELECTRICAL WORKS.

New Plant of Bruce, Peebles & Co., East Pilton, Scotland.

BY EMILE GUARINI.

Messrs. Bruce Peebles & Co. have recently built a new electrical manufacturing plant which is situated at East Pilton, Edinburgh, the works adjoining Granton Road station of the Leigh branch of the Caledonian Railway. An unusual feature of this plant is that British-made tools are in overwhelming predominance and that electrical power is used throughout for machine driving, the only exception to this being several hydraulic jibs and elevators and a few pneumatic hammers.

FIG. I.—GENERAL VIEW OF MAIN SHOP, BRUCE, PEEBLES & CO.

The power plant equipment consists of one 500 and one 250-horsepower engine. Cast iron coil condensers are used in conjunction with these engines and are capable of condensing 5,000 pounds of steam per hour at a vacuum of 27 inches of mercury. The boiler room equipment consists of two boilers equipped with automatic chain grate stokers. The hydraulic plant was installed by McCaggart, Scott & Co. and works under a pressure of 1,200 pounds per square inch. The accumulator in connection with the hydraulic plant is 14 x 8 feet and has a lift of 10 feet. It is furnished with water by a set of three throw motor-driven pumps. The pneumatic plant consists of two compressors and an air receiver, the latter being 9 x 3 feet. The principal use of the compressed air is for lifting water from a well 450 feet deep to an elevated tank. This is done at the rate of 1,800 gallons per hour. A gas producer working on the Duff-Whitfield system is situated just outside the boiler house and supplies gas for heating the annealing and drying ovens.

Two generators in tandem are driven by each engine in the power house, and supply electric current which is distributed by a three wire system. In addition to these generators the power house contains a 350 kilowatt motor-generator set which supplies alternating current for driving a small section of the works and which is also used for testing purposes.

The office building is situated in front of the works and contains the directors' and commercial offices and a dining room for the office force. The designing and drafting rooms and the office of the works manager are located inside the factory.

In planning the arrangement of the shops it was borne in mind that eco-

nomical production demanded that the handling of all material should be reduced to a minimum. Raw material enters at the west end of the works

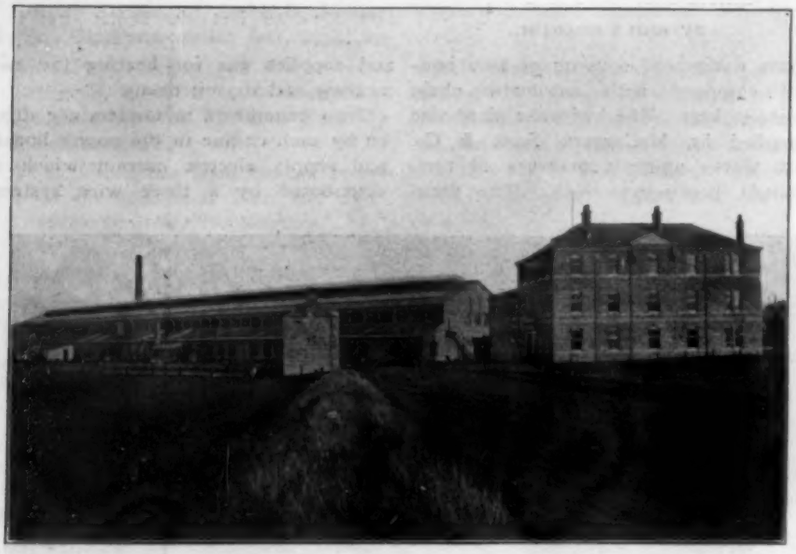


FIG. 2.—EXTERIOR OF BRUCE, PEEBLES & CO.'S SHOPS.

and is there weighed on a 30-ton weigh bridge. At this end of the shop and along the center aisle are located most of the heavy machine tools, the large castings being thus kept in the center of the shop. They are all machined at this end, being erected and tested further down. At the extreme west end is installed a large planer capable of taking a piece 14 x 6 x 6 feet which is driven by an individual 20-horsepower motor. This machine has two heads and runs at a cutting speed of 29 feet per minute with a 2½ to 1 return motion. Adjoining this tool is a side planing machine built by Messrs. Richards. This machine has an 18-foot strock and a 4 to 1 return motion, the cutting speed being 20 feet per minute. The feed which may be used on this tool varies from 1-32 to ½ inch. This planer stands on the edge of a deep pit so that it can handle work up to 18 x 18 x 4 feet. It is clearly shown in the foreground of the illustration Fig. 1.

Beyond this open side planer is installed a horizontal boring mill with a table 10 feet, 6 inches in diameter. This is an extremely useful tool and it has been found that a large portion of the work can be more expeditiously and economically done on it than on a lathe. In addition to this boring mill a large number of smaller ones with tables ranging down to three feet in diameter are installed in the side bays. The boring of large alternator frames, etc., up to a diameter of over 20 feet is at present being done by a temporary boring device, the frame being fixed in a vertical position over a pit and the cutting tool being rotated. While this arrangement gives excellent results as to workmanship it probably does not give the greatest economy in production, and arrangements have been made for the installation of a very large boring mill which will be capable of boring and turning the stators and rotors of the largest slow speed machine. The pit for this tool has been excavated and the machine itself will probably be erected in a short time. A large number of lathes of all patterns are installed in various positions in the shop and an increasing number of automatic machines for detail and duplicate work are being installed, especially in the switch-board and controller departments. This latter department is at present less advanced than the other sections of the works but is being rapidly extended. The punching and core-building departments are now in full operation. The majority of the tools here are of British manufacture with the exception of two or three ingenious small punches made by the Ferracute Machine Co., of Bridgeton, N. J.

Further down the same aisle is the commutator department. Great care is bestowed on the manufacture of the commutator of the direct current dynamo. The alternate copper and mica segments having been assembled, a special clamping ring is forced on by hydraulic pressure of 200 tons. The commutator is removed from the hydraulic press with the clamp still in position and the interior is turned up, the V-ring and bushings placed in position and drawn up tight. The clamp is then removed and the exterior face of the commutator trued up. The commutator being built up in this way the possibility of dropped or displaced bars is almost entirely eliminated and the construction is so rigid that a heavy blow from a mallet causes no injury.

FIG. 3.—ARMATURE WINDING DEPARTMENT BRUCE, PEEBLES & CO.

Beyond the commutator department and in the same aisle is located the armature winding shop. This is divided into two departments for the continuous and alternating current generators. On one side of this department are the drying and anneal-

ing ovens, varnishing room, and pattern makers' shop and at the extreme end the mica, armature-coil forming, insulating and taping, and general light insulating departments. A large number of girls are employed in this portion of the works. The gallery above this aisle is occupied at the west end by offices, in the middle by the field coil winding department and at the east end by copper, brass and detail stores.

Excellent facilities are afforded everywhere for handling material and lifting it on to the machines. The main bay is spanned by two 15-ton three motor cranes, the motors being of the following capacity: 15 horsepower for the lifting motion, 10 horsepower for the travel and three horsepower for traverse. Heavy loads are lifted at a speed of 12 feet per minute and lighter loads at a speed of 24 feet per minute. The travel speed of the crane is 300 feet per minute and the traverse 80 feet. In the side bays are many other cranes of smaller size. There are two six-ton cranes fitted with motors of 12, 7 and 2 horsepower, respectively for the lifting, travel and traverse motions. The lifting speeds are: 6 to 3 tons, 20 feet per minute, under three tons, 40 feet per minute. The travel and traverse speeds are the same as for the large cranes in the main bay. A

FIG. 4.—MOTOR ASSEMBLING DEPARTMENT, BRUCE, PEEBLES & CO.

6-ton crane in the light erecting shop has a single motor, the various motions being obtained by belts. In addition to these cranes there are a dozen smaller travelers. In the main shop and light erecting shop are nine two-ton hydraulic jib cranes in use. These jibs have a very wide span and are found very useful for placing work upon the machine tools. They are strongly trussed as shown in one of the illustrations.

The testing department extends across the width of the shop opposite the engine room. The number of loose wires in this department is reduced as far as possible by running underground leads with terminals suitably protected, adjoining the positions in which standard machines are usually tested. The Hopkinson method is mainly employed. Where high tension alternating currents are required for testing, the transformers

FIG. 5.—SMALL MACHINE TESTING BLOCK, BRUCE, PEEBLES & CO.

are generally brought conveniently close to the machines.

NEW FOLLANSBEE OFFICERS.

Folansbee Bros. Co., with headquarters at Pittsburg and plant at Follansbee, West Virginia, at its recent annual meeting increased the number of directors from five to seven, the new members being William Banfield and J. D. Lyons, who with B. G. Follansbee Wm. U. Follansbee, Nathan Holmes, H. Darlington and W. W. Bell now compose the directorate. The old officers, B. G. Follansbee, secretary and treasurer, Wm. Banfield, general manager, Geo. L. Follansbee, assistant treasurer, Chas. A. Wilson, asstistant secretary and Wm. D. Reed, auditor,—were re-elected. The officers decided to hasten the construction of the new steel plant of the company at Follansbee, W. Va., and it is expected to have it in operation some time during the coming summer. This plant will contain three 15-ton basic open-hearth furnaces, casting department, soaking pits, etc., a large hammer, hydraulic shears, complete bar mills, electric cranes and electrical equipment throughout.

The Argentine Congress has voted $100,000 toward a national agricultural exhibition to be held at Montevideo, capital of Uruguay, next fall, probably in September. This will afford a splendid opportunity for the manufacturers of the United States to exhibit.

OPEN-HEARTH STEEL CASTINGS.—I.

BY W. M. CARR.

In view of the growing interest in the production of steel castings and their increasing utility, it is proposed to put before our readers a series of articles treating of the salient points of their manufacture by the acid and by the basic open-hearth processes. The articles will cover, (1) the selection and representative compositions of melting stocks, alloys, refractories, fuels, molding sands; (2) furnace construction, melting manipulation of heats; (3) conditions of molding as affecting physical properties of products; (4) analyses and physical tests of different grades of product; (5) effect of constituent metals and metalloids usually present in open-hearth steel castings; (6) heat treatment or annealing, with notes on the microscopic examinations in connection therewith; (7) blow-holes, shrinkage-cracks, etc., with a discussion of their causes; (8) repairing of certain defects by thermit welding; (9) special or alloy steel castings.

Materials for Acid Practice.

Melting Stock.—The composition of materials for acid castings comes within well defined limits, for the main reason that the process is nearer a melting, rather than a refining one, owing to the fact that the metalloids, sulphur and phosphorus, are not removed during the conversion of the charge. As their presence in the finished product must be subject to specification, it follows that the melting stock must be bought with a limit to the contents of the elements named. Only in regard to quantities of sulphur and phosphorus exists the distinction between acid and basic melting stock. Pig iron for ordinary practice analyzes as follows:

Total Carbon	2-3.5 per cent
Silicon	0.50-1.5 per cent
Sulphur	0.04 or less
Phosphorus	0.04 or less
Manganese	0.50-0.75

In addition to pig iron, steel scrap known as "basic scrap" is also bought on analysis or chemical specifications. Being the product of rolling mills, etc., following basic practice, the contents of sulphur and phosphorus are usually low, and they are the only elements of composition taken into account. A representative analysis of steel scrap for acid practice is as follows:

Sulphur	0.015-0.03 per cent
Phosphorus	0.010-0.03 per cent

Since the physical character is usually represented by billets, crop ends, blooms, plate-shearings, defective castings and waste metal from steel foundries, the nature of them necessarily predetermines the composition in regard to the presence of carbon, silicon and manganese. With a charge of pig iron and steel scrap it is comparatively easy to keep the composition of finished product within acid specifications.

Refractories.

Silica sand forming the hearth of the furnace, known chemically as an acid, lends its classification to distinguish between the two processes. It does not present a condition wherein certain elements are removed during melting of stock, namely, sulphur and phosphorus. The amounts of those elements charged will be found in the finished product. The function of silica sand is mainly a refractory one. That is, it must have heat resisting qualities, but not to the extent that it will not set or sinter silghtly to satisfactorily preserve the contour of the shallow dish-like formation of the hearth. It must not be too fusible, otherwise there would be excessive scorification or cutting of the hearth. It must set or sinter sufficiently to resist abrasion due to the charging of stock. It is difficult to lay down strict chemical specifications for silica sand. There are certain conditions of composition not expressed by an analysis of the total constituents. The combinations of them with their neighbors cannot be ascertained. However, a silica sand of the following analysis gave excellent results in practice:

Water	0.24 per cent
Silica	97.25 per cent
Alumina and Iron Oxide	0.16 per cent
Lime	0.08 per cent
Magnesia	0.39 per cent
Alkalies	0.36 per cent
Loss on Ignition	.36 per cent

There are several deposits of silica sand in the west and middle west that are supplied to steel foundries and no difficulty will be found in getting the best quality for the purpose. As a general rule a silica sand for hearth lining must be low in lime, magnesia and the alkalies (potash and soda); an excess of any tends to lower the fusion point of the sand, destroying its required sintering or refractoriness. Usually a silica sand with less than 95 per cent silica will not answer for a refractory.

Fuel.

It is a question of local conditions as to whether the fuel may be natural gas, oil, tar, or producer gas. Natural gas is by far the most satisfactory, owing to its high calorific value and its non-contamination of the bath or molten charge. It is fed directly into the working body of the furnace without any preheating or a passing through the regenerator chambers. Oil, next in efficiency, may be crude petroleum or a grade known as residuum; a by-product of petroleum distillation. The heating values are high, and in certain grades the composition will answer for acid work. Some grades are rather high in sulphur, which is absorbed by the stock in melting.

Tar has been satisfactorily used when available as a by-product in the manufacture of coke by Otto-Hoffman retort ovens. The construction of burners permitted a simultaneous burning of the gas resulting from the coke retorts.

Producer gas is used extensively and when near a reliable supply of coal, is considered cheaper than the aforementioned fuels. A description of gas producers and liquid fuel burners will be given in subsequent chapters. Gas distilled in a producer does not have as high a heating value as liquid fuels, nor is the efficiency so great, because much of the total heat units are lost in the process of distillation of the coal (soft or anthracite). With liquid fuels or natural gas the total thermal efficiency is available within the working body of the furnace, there being no intermediate losses before delivery at the point of combustion. Natural gas or liquid fuels are easy of control in flame regulation; furnace construction and repairs are simplified and lessened; regularity of product and longer campaigns are assured. Producer gas is irregular, and owing to heavy deposits of tarry and sooty matter, regular weekly stoppages must be made to clean out mains and flues. Liquid fuels or natural gas eliminate such losses of working time.

Heating Value of Fuels.

	B. T. U.	
Natural Gas	300-600	per cubic foot
Oil	14000-17000	per pound
Tar	15000	per pound
Producer Gas	100-150	per cubic foot
Bituminous Coal	10000-12500	per pound

One ton of bituminous coal yields in a modern producer, 160,000 cubic feet of gas with 65 per cent efficiency in heating value of the coal.

Alloys.

Ferro-Manganese.—The Standard quality contains 80 per cent manganese. A representative analysis will be as follows:

Iron	12-14	per cent
Manganese	80.00	per cent
Carbon	5-6	per cent
Silicon	0.5 -1.00	per cent
Sulphur	0.010-0.03	per cent
Phosphorus	0.100-0.75	per cent

Ferro-Silicon.—The standard grade carries 13 per cent silicon and is usually sold on a guarantee of 11 per cent of that element. The following is a usual analysis:

Silicon	9-13 per cent
Carbon	1- 2 per cent
Sulphur	0.04-0.08 per cent
Phosphorus	0.10-0.50 per cent

Note:—This is the first of a series of articles on this subject which is running in the *Foundry*. An arrangement has been made whereby they will appear concurrently in THE IRON TRADE REVIEW. The second installment will appear next week, and the following numbers in the second issue of each month thereafter.

In recent years there have been put on the market several grades of electrolytic silicons that are very satisfactory. The most economical grade is the one carrying 50 per cent silicon, and considered on the basis of the unit cost of silicon, is cheaper than the commoner alloy. The following is a typical composition of an electric furnace ferrosilicon:

Silicon	50-52 per cent
Iron	44-46 per cent
Carbon	0.15 -0.25 per cent
Sulphur	0.003-0.010 per cent
Phosphorus	0.04 -0.06 per cent

The purposes of the aforementioned alloys will be considered farther on.

Iron Ore.—The purpose of iron ore is two-fold. One is to increase the fluidity of plastic slags, the other as a carrier of oxygen to assist in the removal of the carbon from the bath of molten metal. The total iron liberated in the interchange between its oxygen and the carbon of the bath adds to the yield of metal. The most satisfactory ores for open-hearth practice are the magnetites or hard hematites. The soft ores are apt to dissipate their combined usefulness in the slag instead of oxidizing carbon. No particular limits are placed on their compositions, excepting that they be high in iron and moderately low in phosphorus. A fair analysis is as follows:

Iron	60-68 per cent
Silica	1-5 per cent
Sulphur	0.05-0.100 per cent
Phosphorus	0.03-0.500 per cent

Molding Materials.—Since all steel castings are poured at higher ranges of temperature than gray iron or malleable castings, it is essential that the sands and clays (binders) be as refractory as possible. Pure silica is the most desirable—the purer the better. The following is an analysis of a typical steel molding sand:

Silica	98.5 per cent
Alumina	1.40 per cent
Iron Oxide	0.06 per cent
Lime	0.20 per cent
Magnesia	0.16 per cent
Combined Water	0.14 per cent
Alkalies	0.25 per cent

It must be of such a nature or structure physically that the heated gases in the mold when displaced by liquid steel will have a free passage outwardly. It is preferable that the grains be sharp and irregular rather than rounded as would be the case with sand subjected at some time to the action of water. The color is often white or slightly tinged with yellow. Its color is not necessarily a guide to its qualities, but it is often an indication.

Fire Clay.—Pure silica sand having no binding properties, varying amounts of clay are mixed with it to give the sand a needed bond and substantiality to the mold prepared for the reception of the hot steel. The clay must also be refractory and possess a maximum degree of plasticity. Low grade sands and clays would fuse at the temperature of liquid steel and cause the castings to be of an irregular rough surface. An attempt to economize in the sand pile is apt to spoil one's reputation for clean-looking castings.

It is not always reliable to have recourse to chemical tests on refractories or molding materials, since actual practice will affirm the desirable qualities in them. The following is a typical composition of fire clay:

Silica	60-66 per cent
Alumina	25-20 per cent
Iron Oxide	nil- 2.00 per cent
Lime	nil- 1.00 per cent
Magnesia	nil- 1.00 per cent
Alkalies	nil- 2.00 per cent
Combined Water	7.50-10.50 per cent

The value of a fire clay depends largely upon a low content of alkalies and a freedom from carbonates of lime. Oxide of iron has a strong fluxing effect, but its presence below 3 per cent is harmless.

Core Compounds.—Any reliable proprietary article will answer and the list will include molasses water, rosin, flour, linseed oil, etc., all of which are too well known to need any description.

Materials for Basic Practice.

Melting Stock.—In this particular basic melting possesses a marked flexibility in selection of stock over acid melting. It is by some considered a sort of metallurgical scavenger. While it is true that there are greater latitudes in quality of pig iron and scrap yet it must not be overlooked that the promiscuous dumping of any kind of stock into a basic furnace cannot yield a reliable product. If good castings are the object sought, discretion must be observed in the selection of materials entering into their manufacture. In regard to quantity basic pig iron greatly exceeds acid pig so far as availability is concerned. The ores of the southern and south-western states are plentifully endowed by nature for the yield of unlimited supplies of basic pig. As to scrap, the situation is somewhat of an uncertainty, owing to the inroads made by the larger interests engaged in the production of ingots in basic bottoms, in consequence prices for scrap have a tendency to gradually rise. The factors controlling the choice between basic and acid practice for castings are ones of location and contiguity to the sources of supply of raw materials. So far as the relative value of the product of either process is concerned, it is true that basic castings are fully as satisfactory, from the view point of quality, as those made by the acid process. It must be remembered, one is a melting method and the other a refining one. The basic process to get good results needs intelligent handling and a higher development of melting skill. The pig iron necessary is known as "Standard Basic" and the following analysis represents the ulterior limits in composition.

Silicon	1.00 per cent
Sulphur	0.05 per cent
Phosphorus	1.00 per cent

silicon and again as high as 0.07 sulphur. Shipments of these grades on standard contracts can be accepted at a concession in price and it is permissible to use a moderate amount of "off-basic" in charges with no harm to follow. As was mentioned under "Acid Melting Stock" the sulphur and phosphorus charged in that process would equal that of the finished product. In basic melting it is possible to eliminate 50 to 75 per cent of the sulphur and 95 per cent of the phosphorus, thanks to the character of the lining of the furnace and slags formed by the liberal additions of limestone with the charge. For castings it is desirable to have on hand several brands of basic pig; some with low phorphorus and some with high manganese. Certain brands can be obtained with prosphorus as low as 0.200 while standard in other particulars and at ruling prices. Brands with high manganese ranging from 1.5 to 3.00 per cent command a higher price. It is not good practice to make the entire pig iron charge high phosphorus stock. The reasons for mixing brands in regard to phosphorus and manganese will be considered under furnace manipulation.

Steel Scrap.—The character of this material is not considered chemically because the physical nature of it brings it well within working limits as to composition. It is usually designated "heavy railroad melting scrap" but liberties are sometimes taken and unless the consumer exercises circumspection almost anything may be found in it from shop sweepings to tomato cans. *Heavy* scrap is the desideratum, and may consist of, as an illustration, steel rails, knuckles, draw bars, wheel centers, car-springs, fish-plates, defective castings (steel), ingots, etc. Gray iron castings should be religiously excluded when sold as steel scrap. It is allowable to use limited quantities of defective malleable castings although draw bars of such materials are sold as steel. Five per cent of the scrap charge in malleable scrap will not upset the melter's calculations. The scrap charge will be augmented by daily waste from the foundry.

Refractories.

The hearth of basic furnaces in American practice is made with magnesite,

a substance classified chemically as a base and possessing the quality, in addition to resisting high temperatures, of being but slightly affected by a slag highly charged with lime which would be fatal to a hearth lined with silica sand. To lengthen the life and efficiency of a basic hearth the first consideration is to keep out of the charge as much silicious matter as possible. Magnesite, the carbonate of magnesia is an importation from Austria, where it is calcined converting it into magnesia, the oxide of the metal magnesium, by the removal of the major portion of carbon dioxide. It is still considered commercially as a magnesite. Its composition ranges as follows:

Raw.

Magnesium Carbonate	93.19 per cent
Calcium Carbonate	1.43 per cent
Iron Carbonate	2.61 per cent
Silica	2.75 per cent

Calcined.

Magnesia	90-95 per cent
Lime	1-2 per cent
Iron Oxide	0.5-3.50 per cent
Silica	0.5-2.75 per cent
Volatile Matter	0.5-1.00 per cent

Dolomite.—The material is extensively deposited in the United States. It is a double carbonate of lime and magnesia. It is used either calcined or raw. Principally it is used for patching slag lines, where scorification of the hearth is the heaviest. It is not recommended for points below the slag line. A typical analysis is as follows:

Raw.

Silica	0.5-2.00 per cent
Iron Oxide, Alumina	0.5-2.00 per cent
Calcium Carbonate	50-55 per cent
Magnesium	40-44 per cent

Calcined.

Silica	0.5-2.00 per cent
Iron Oxide, Alumina	0.5-2.00 per cent
Lime	50-55 per cent
Magnesia	37-45 per cent

Chrome Ore.—A substance highly refractory to heat and neutral to the action of acid and basic slags. Unfortunately it has no bond and for that reason its uses are somewhat limited. It is used for patching parts of the hearth where cutting above the slag line is severe upon the brick work, usually in gas ports and door jambs. (In European practice it is stated that entire hearths are lined with lump chrome ore.) Aside from patching it is used as a neutral lining between magnesite and silica bricks. Its composition is as follows:

Chromic Oxide	40-60 per cent
Iron	15-18 per cent
Alumina	5-30 per cent
Silica	1-5 per cent

Fluxes.

The most efficient in basic melting is ordinary limestone. Its function is to form a slag that will readily absorb the sulphur and phosphorus of the charge and act as a vehicle for the oxidizable silicon iron and manganese. The purer the grade the better, that is, a richness in carbonate of lime and a freedom from silica.

A fair analysis is as follows:

Silica	0.25- 1.00 per cent
Oxide of Iron and Alumina	0.50- 2.00 per cent
Carbonate of Lime	95.00-99.00 per cent
Carbonate of Magnesia	0.5 - 1.00 per cent

Fluorspar.—The function of this material is to thin a limey slag when in the judgment of the melter it seems thick or sluggish. A moderate addition of fluorspar will liven it and its action may be likened to certain fluxes used in brazing metals—the property of dissolving at higher temperatures metallic oxides. It is plentifully deposited in the United States. A good grade will analyze as follows:

Calcium Fluoride	90-98 per cent
Oxide of Iron and Alumina	0.5-1.00 per cent
Silica	nil-1.00 per cent

Iron Ore.—See "Acid Melting Materials."

Alloys.—See "Acid Melting Materials."

Fuels.—See "Acid Melting Materials."

As a guide to purchasing stock the following tabulations will be of assistance in furnishing approximate amounts for regular consumption. The figures are based on the different kinds of stock necessary to produce 1 net ton of castings:

Pig Iron	620 pounds	1227 pounds
Steel Scrap	1880 pounds	1227 pounds
Ferro-Silicon	54 pounds	57 pounds
Ferro-Manganese	28 pounds	35 pounds
Iron Ore	26 pounds	30 pounds
Aluminum	3-10 pounds	3-10 pounds
Limestone		300 pounds
Magnesite		34 pounds
Silica Sand	1800 pounds	1600 pounds
Fire Clay	300 pounds	350 pounds
Gas Coal	950 pounds	1250 pounds
Fuel Oil	55 gallons	80 pounds
Boiler Coal (power)	900 pounds	900 pounds

Large Wire-Glass Order.—What is said to be one of the largest single orders for wire glass ever placed at one time by one company, was recently given to the Pittsburg Plate Glass Company for 150,000 square feet of fire-proof wire glass for use in the West Allis works of the Allis-Chalmers Co. The total number of pieces will reach approximately 17,415 and would cover, if laid edge to edge, an area of three and a half acres.

HEAVY CONTRACTS

For Equipment Closed by Atikokan Iron Co.—Canadian Notes.

(Special Correspondence.)

Toronto, Can., Jan. 29.—The Canada Foundry Co., of Toronto, has secured contracts amounting to about $200,000 for the steel and iron work for the Atikokan Iron Co.'s blast furnaces at Port Arthur. The order includes four 225-horsepower Canada water-tube boilers and also steam plant and pumping machinery for the ore docks and circulating water machinery for the steam plant and blast furnaces. The company undertakes the installation of the plant. The boilers will be ready about March, and the furnace in June. The work will be in accordance with specifications of F. C. Roberts & Co., of Philadelphia. Frederic Nicholls, of the Canada Foundry Co., has gone to Winnipeg, in connection with the contract. The Atikokan Iron Co. has let other contracts for structural steel, etc., to the Canada Bridge Co., for about $700,000, and the Caledonia Iron Works, Montreal, for $20,000, and orders have gone to several American firms for machinery not made in Canada.

Laboratory experiments made by J. W. Evans, C. E., of Deseronto, Ont., have resulted in producing steel made directly from iron ore by the electric furnace Samples of the product have been received by Director T. W. Gibson, of the Ontario Bureau of Mines. One of these was produced from titanium iron ore from the Horton mine in 15 minutes, and the other from the sulphurous iron ore of the Coe Hill iron mine, Hastings Co., in 20 minutes. Drillings made in the Coe Hill steel product show it to be a readily workable article.

Dr. Eugene Haanel, Dominion Superintendent of mines, has gone to Sault Ste. Marie, to make an inspection of the experimental plant erected there by Dr. Herault, the French expert, to test the feasibility of smelting Canadian magnetite ores by the electric process. The experiments so far conducted at the Sault have been with a small furnace, but the decisive test will be made by treating large bodies of ore in a furnace of special design. Incidentally it has been found that nickel pig can be produced by treating nickeliferrous pyrrhotite electrically—a discovery which is regarded as of considerable importance to the nickel industry.

The Canadian Westinghouse Co., of Hamilton, Ont., has secured a $90,000 contract from the British Columbia Electric Railway Co., of Vancouver, for putting in a 1,500 kilowatt generator and sub-station plant, etc.

The Massey-Harris Co., of Toronto, manufacturer of agricultural implements, etc., is arranging for the erection of a

large warehouse in Brandon, Man., which will be made one of the chief distributing points for the west.

A. C. Pratt is traveling in western Canada, in the interests of the Canadian Tin Plate and Stamped Steel Co., of Morrisburg.

The following companies have been incorporated: Robert Gardner & Sons Ltd., Montreal, $145,000, to manufacture machinery, engines, etc. Incorporators, Robert Gardner, James Gardner, Wm. Gardner, Daniel Currie and James B. Rowley.

The Elevator Specialty Co., Ltd., Toronto, $40,000, provisional directors George A. Matthews, William J. Feeney and George Ritchie.

SCHWAB IS OPTIMISTIC.

Charles M. Schwab is exceedingly optimistic over present conditions in the iron and steel industry and the prospect of their continuance. In a recent interview he said: "The iron and steel business is not only good, but improving. Those who think they begin to see the limit of it are deceiving themselves. Steel and iron are the life of the country; you may say they are the life of the world. They are now beginning to enter fields where a few years ago no one thought of seeing them. They are being put to every conceivable use. The only difficulty experienced now is to supply the demand. Every plant is being worked to its capacity, and new plants are being arranged for. It is the matter of supply that is bothering the iron and steel men now. They have more orders than they know what to do with.

"It may safely be said that there is not a steel and iron company in the United States that is not booked for months ahead. This is unfortunate, because it tends to retard many contemplated operations, but it cannot be helped. No one could have definitely foreseen such a state of affairs, although every man of experience and judgment must have felt that it was coming. Now that it is here, and here to stay, the steel and iron producers are doing their best to meet the situation, and are expending millions of dollars in new construction.

"This matter of new construction is a most important one, and will continue so for some time to come. There is no danger that it will be overdone, for the reason that when it is finished the demand still will be in excess of the supply. There is no reason for being timid about the future. It will be better than the present, just as the present is better than the past."

The production of open-hearth steel rails in the United States during 1904 was 145,883 long tons.

THE NEW YORK MACHINERY TRADE.

The Rush for New Equipment Continues — Deliveries Still Slow.

The sales offices in the machinery district of this city have been even more busy during the past month than during December. The demand for tools and equipment of all kinds continues as brisk as could be desired considering the pressure under which the builders are working. Deliveries have improved only slightly and the difficulty of securing prompt shipment of goods is the one unsatisfactory feature to the salesmen, a circumstance which, however, causes no complaint among the manufacturers. One salesman remarked: "We could sell twice as much as we do if we only had the goods to show. When we say eight weeks the customer turns up his nose and walks off. On several machines we are obliged to quote six and seven months, and one particular make we cannot undertake to deliver until 1907." In the line of small tools matters have improved somewhat, not because the normal capacity of the shops is ahead of sales but because the factories are able to turn out extra quantities by extending the working hours into the night. With the larger machines this is not the case, and deliveries are as long as they were last month.

There have been comparatively few long lists such as were issued by the leading railroads during December, but enough of those were carried over into the new year to furnish business for many shops, and some still remain to be cleaned up. With the requirements which have been presented and the needs of the construction already planned and in prospect there will be no dearth of inquiries for some months to come.

The threatened increase of import dues on American machinery entering Germany has not created as great a stir among the tool men as might have been expected, although the augmented shipments for the purpose of getting the goods into the country before March 1, when the new schedule goes into effect, indicates some anxiety. It seems that the German dealers are more keenly alive to the situation than their American brethren for it is said that considerable supplies have been acquired and set aside for future use.

Where Machinery Will be Required.

The needs of the railroads have not all been supplied. Besides the portions of the big lists yet to be placed some new specifications have made their appearance. The Denver & Rio Grande Railroad has issued a call for a large amount of new machinery and the Norfolk & Western is also said to contemplate improvements which will involve the purchase of a large supply of new tools. Much machinery will also be required in erecting the 100,000 tons of structural steel which is now under negotiation into buildings in this city and for equipment before completion.

Of the new shops and additions to factories begun before the winter set in many are still to be supplied and it is no doubt to these undertaking of moderate size that the trade owes its present healthy tone. But there are also a number of public and semi-public works, mostly already mentioned in these pages, which will require large quantities of machinery. Among projects reported during the past few days is the proposed change of the Jersey City tunnel of the Erie Railroad into an open cut. This will involve the removal of many thousand cubic feet of earth and rock and will furnish work for excavating and rock drilling and handling machinery of all kinds. The new mill now being erected by Milliken Bros. Inc. and the rolling mill and furnaces soon to be built by the Bethlehem Steel Corporation are only larger examples of what is on foot everywhere.

CINCINNATI EMPLOYERS.

The Employers' Association of Cincinnati, at a meeting held at the Business Men's Club on the evening of Jan. 23, chose the following officers: A. H. Pugh, president; Tenry Rattermann, William Lodge and Samuel Bailey Jr., first, second and third vice presidents; Dr. J. M. Crawford, treasurer; J. C. Hobart, Ernst F. DuBrul, Henry C. Yeiser, Fred A. Geier, H. H. Meyer, M. B. Farrin, M. E. Moch, S. F. Dana, R. R. Reynolds, A. W. Williamson and C. H. M. Atkins, executive committee. The work of the past year was reviewed and Rev. H. M. Curtis, speaking on "The Chasm," said it was not the laboring men in general, but the agitators who make the trouble and bring the unions into disrepute. The Wynne bill, pending in the Ohio legslature, proposing to raise the age limit at which children may lawfully be employed from 14 to 16 years, was vigorously opposed by two speakers, superintendent Miller of the Western Union and J. E. C. Maddox.

A fireless steam locomotive (the Hohenzollern) is being introduced in England by a London and Manchester firm. Over 200 of these are in operations in factories for making explosives, mines, chemical works, timber yards, and similar situations where absence of sparks and smoke is desired, or for intermittent work.

REFRACTORY USES OF BAUXITE.

BY A. J. AUBREY.*

Bauxite is a hydrated oxide of aluminum corresponding to the chemical formula (Al_2O_3 $2H_2O$), although the proportion of water varies greatly and the aluminum is sometimes replaced by iron. Silica and titanium oxide occur as impurities. Silica varies widely in different deposits. Other oxides of aluminum containing water are diaspore, ($Al_2O_3H_2O$) and gibbsite, (Al_2O_3 $3H_2O$). These are found in small quantities however. The anhydrous oxide of aluminum, known as corundum (Al_2O_3) is found in still smaller quantities than the above, so that bauxite is the only oxide of aluminum found in considerable quantities. There are three localities in the United States where bauxite has been found in commercial deposits, viz; in Arkansas, New Mexico and the Georgia-Alabama district. The last named district has probably been worked out by this time and at resent the chief sources of the ore are the Arkansas deposits.

The crude bauxite is washed at the mines to remove some of the free silicon. It is next calcined at a temperature of 2,500 degrees F. approximately Seger cone 12 and during this process it gives off its chemical water amounting to about 30 per cent of the raw ore and also undergoes great shrinkage. It has been observed that the bauxite shrinks very little until after Seger cone 9, approximately 2,390 degrees F., is reached and from Seger cones 9 to 12 the greatest amount of the shrinkage takes place. Accordingly the lowest temperature limit at which bauxite should be calcined is 2,500 degrees F.

An analysis of washed calcined bauxite from Arkansas made by the writer is as follows:

Mechanical water	0.88%
Silica	6.40
Oxide of iron	1.43
Alumina	87.30
Titanium oxide	3.99

The calcined material can be bonded with fire clay, sodium silicate, or lime and made into brick and tile. As little as four per cent plastic fire clay can be used for a bond for hand made brick. When bonded with lime the bricks become quite hard a few hours after making, so hard that they will not take the impression of the finger nail. This setting or hardening is probably due to the formation of a calcium silicate between the lime and the free silica analagous to the setting of silica brick when bonded with lime. After a careful drying treatment the bricks are burned in down-draft kilns at a high temperature and when burned they are hard and tough and can be thrown to the pavement or batted vigorously against one another without breaking. A brick 9 x 2½ x 4½ inches weighs 7½ pounds and stands a crushing test of 10,000 pounds per square inch.

The problem of calcining the washed granular bauxite presents itself. It can not be successfully calcined in a vertical shaft kiln because it will pack and clog on account of its fineness and so obstruct the passage of the kiln gases. On the other hand it is not feasible to calcine it in the ordinary down-draft kiln on account of the perforated floor. The writer believes that to calcine it on a commercial scale would require a rotary kiln using oil, gas, or powdered coal for fuel, preferably the former. Provided the cost of fuel is low at the mines these kilns should be installed there in order to save the cost of transportation which is now paid on the thirty per cent of water that the crude bauxite contains.

For basic open-hearth steel furnaces a brick high in alumina and low in silica is required. A brick of this character is obtained in the following way: A pure white variety of the pisolitic bauxite which has already been washed at the mines and a portion of its free silica removed is selected and sieved. All the fine material passing through the sieve is rejected as it contains the greater part of the silica. The pisolites or pebbles about the size of peas are retained, as they are higher in alumina and freer from silica than any other part of the bauxite. Now by using lime selected for its freedom from silica, as a bond, a brick can be procured which will contain as low as six per cent or eight per cent silica.

A high silica content has always been the chief objectionable feature of bauxite brick for basic open-hearth steel furnaces because the silica is attacked by the basic slag. Authorities on open-hearth practice have generally declared that bauxite brick would be suitable for basic open-hearth furnaces provided a brick could be made with less than 12 per cent silica content. And indeed recent tests made along this line seem to bear out this statement.

A test was made several months ago in one of the basic open-hearth furnaces of the Bethlehem Steel Works, in which a bauxite and a magnesite brick were placed side by side near the gas and air ports and submitted to the highest temperature attainable in the furnace. The magnesite brick bent and showed viscosity after a period of seven minute against a period of fifteen minutes for the bauxite brick. Again, a magnesite brick and bauxite brick were bathed in the slag near the doors for a definite period after which they were withdrawn and examined when cold. The magnesite brick was incorporated with slag while the bauxite when broken open showed that the slag had not penetrated to its center but had remained as a coating over the outside. Both bricks were quite badly affected but it was readily apparent that the bauxite withstood the action of the corrosive slag equally as well as the magnesite.

More recent tests with brick having a lower content of silica have shown up equally as favorable as the magnesite when exposed to the action of the basic slag. The comparison is hard to make in any case because of the fact that either bauxite or a magnesite brick if left in the hearth of the furnace for any length of time and submerged in the slag are so violently attacked that the differences in the portions that are taken out are not easily detected. Even a magnesite brick if thrown into a basic open-hearth furnace will be entirely eaten away after considerable length of time so that the only test of bauxite brick will be to build a hearth or portion of hearth out of these brick and test them, covering them with calcined bauxite and treating them in every way like the magnesite hearths are treated. Some steps are now being taken towards accomplishing tests of this character.

Sir Wm. Siemens found that bauxite was a superior furnace lining and even though he used an inferior bauxite containing as much as thirty-five per cent of oxide of iron. He claimed that they lasted five or six times as long as the "Stourbridge First Brick." Siemens also says of bauxite: "It is important to observe that bauxite when exposed to intense heat is converted into a solid mass of emery of such extreme hardness that it can hardly be touched by steel tools and is capable of resisting mechanical as well as the calorific and chemical action to which it is exposed."

Bischof in his "Feuerfesten Thone" says that bauxite, "when not impure on account of the admixture of foreign substances, especially of iron which generally occurs in considerable quantities in compounds of aluminum, is extremely refractory." He also goes on to say, that "The addition of varieties free from iron, or the white ones, to other refractory clays offers the only important means known of increasing their percentage of alumina, and at the same time their refractoriness."

It appears then that bauxite has been regarded as a refractory material for a long time but that no definite use has been made of it, also that the inferior grades have been more generally tested than the purer ones.

Other than its uses for open-hearth furnaces, which by the way, is being thoroughly exploited and investigated to make certain of its fitness before

*Chemist, Laclede Fire Brick Mfg. Co., St. Louis.

taking any risks, bauxite brick have shown up quite successfully in other lines.

Two recent applications are its uses, first as a lining for Portland cement kilns, and second as a lining for lead refining furnaces.

As a lining for a Portland cement kiln it has shown unusual durability and has given excellent service. As an experiment, the hot zone (about ten to twelve feet) of a sixty-foot rotary kiln fired with coal dust, was lined with a six-inch bauxite lining whereas the kiln had previously been lined with nine-inch fire brick block.

A block for lining rotary Portland cement kilns in the hot zone must possess the following qualities: It must neither be too hard or too soft, for if too hard it will not allow the cement coating to stick to its surface, and if too soft it will not hold the coating but the latter will pull off bringing portions of the brick with it. The cement coating affords an excellent protection for the lining and if brick do not hold this coating they soon burn out. The bauxite block made for this purpose is suitable as it has all of the aforesaid qualities.

After ten months continuous service night and day this six-inch lining is still doing the work. The loss of output in cement for every twenty-four hours that one of these rotary kilns is shut down is equivalent to the sum of $250.00. As the minimum time required for lining or patching a kiln in the hot zone is from thirty-six to forty-eight hours one can easily estimate that the loss of output will be equivalent to a sum varying between $375.00 and $500.00. In this case it is quite apparent that a superior lining will be the cheaper in the long run. Again it must be remembered that only the hot zone need be lined with a bauxite block.

The second and most recent application of bauxite brick has been that of lining portions of lead refining furnaces. Pig lead containing copper, antimony and occasionally arsenic and other metals in small quantities is charged into the hearth of the refining smelter and melted by the reverberation of hot gases from above.

The hearth of the furnace, which is ten by thirteen feet in dimensions, is lined on the bottom by nine-inch square brick set on end. The sides of the furnace are lined with a single course of nine-inch brick laid with ends against the walls.

The temperature of the furnace is from 1,300 to 1,400 degrees F. and outside of the part it plays in melting the fluxes bears no relation to the destruction of the brick, as they are sufficiently refractory to withstand much higher temperatures. It is purely a case of chemical action on the brick.

During the process of refining, a scum rises to the surface of the molten lead and this scum contains most of the impurities which the refining is designed to remove. It consists largely of litharge or yellow oxide of lead, PbO, copper oxide, CuO, and antimony oxide, Sb_2O_3 with possibly oxides in much smaller amounts.

Wherever the brick are exposed to this scum, particularly around the doors, where there is a larger supply of oxygen and accordingly litharge is more easily formed, and along the level of this scum, they are badly eaten away and have to be taken out after several weeks' service and generally have to be patched after a week has passed. Consequently the furnace loses much time for repairs which lowers its output considerably.

The cutting away of the brick is explained as follows: Multiple silicates are formed between the oxides of the metals in the scum and the silicates of alumina and free silica in the brick and these are very fusible, because lead oxide, PbO, which is one of the most fusible of the oxides, comprises the greater part of the base or RO element of the silicate. But there are also several other oxides in the base of the silicate and it is quite well understood that multiple are more fusible than single silicates.

Hence as very fusible silicates are formed between the scum and the fire brick, the brick are very rapidly decomposed and eaten away. It was observed that a porous brick wore out faster than a dense brick, also that the scum penetrated along the joints for several inches beyond the exposed face of the brick. This is probably due to the fact that the raw fire clay which was used in making the joints is much more soluble in the scum than the burnt clay. Accordingly great care should be taken in laying up the brick to see that the joints are as tight as possible.

Whereas the scum was composed of highly basic oxides it was considered reasonable to supplement a basic lining for the fire brick lining and accordingly a lining of bauxite was put in wherever the brick were exposed to the slag. The result was that the bauxite brick lasted from five to six times as long as the fire brick lining.

With its above mentioned uses and its possible advent into open-hearth practice and elsewhere, the writer feels that bauxite brick will at some future date comprise one of our most valuable and useful refractory materials.

NEW ENGLAND FOUNDRYMEN.*

History of The Association by The First President, George H. Gibby.

Along in the fall of 1895, the foundrymen of Boston received a demand from the Iron Molders' union for an increase in wages, abolishment of piece-work, and recognition of the Iron Molders' union. The foundrymen up to this time had never been brought together, in fact, it was considered almost a crime to know one of our competitors, and very few of the foundrymen knew each other, even by sight.

We were called to meet in John A. Andrew Hall, and there were 10 foundries represented, these being the Mechanics Iron Foundry Co., Howard Iron Foundry Co., Dodge Iron Foundry Co., George H. Lincoln & Co., S. K. Lovell & Co., Broadway Iron Foundry Co., Bunker Hill Foundry Co., Lynn Foundry Co., Barbour-Stockwell Co., and the Condor Iron Foundry Co.

We held several meetings, and while the results as far as making any decided stand against the Iron Molders' Union were concerned were small, the idea was presented there to make a permanent organization, and Mr. Barbour and Mr. Foster were appointed a committee to draft a constitution and by-laws, and to report at a later meeting. Invitations were sent to all the iron foundries in New England, requesting them to become members.

Mr. Stockwell was elected secretary of the first meeting, and has held that responsible position ever since; a record, which, I feel, is almost unparalleled in the history of associations of this nature, and when you consider that he has devoted his time and energies all these years without any recompense and without any hope of gain except the desire to see this association a success, he certainly is entitled to the lasting thanks of the members. We have a Lincoln; he is not the savior of the country, but the saver of our funds. He was the man who held the first money collected by this association, has been in office continually since that date, and has the confidence and esteem of our entire membership. George H. Gibby was elected president.

From this small beginning has sprung this organization which has 120 members, consisting of 118 active and two honorary members, and when you consider that each member represents a firm or corporation, every one of which operates a foundry or deals in supplies for foundries, you will understand that this body is a powerful one, whose influence is

*Paper read before the New England Foundrymen's Association.

bound to be far reaching in the future.

These 118 members are composed of 94 foundries which make machinery, stove, malleable, steel and brass castings, and 24 supply houses which furnish pig iron and all supplies needed by the foundries. These 94 firms employ in their foundries at the present time aboot 12,500 men, and the capital invested in the foundries is approximately $14,000,000.00, and the cost of the castings made is approximately $30,000,000.00 per year. You can readily see that we represent an industry of great magnitude and importance. These figures are not the total of the products of these firms, but only the totals of the foundry industry. A number of our members are owners of large works which embrace the finished products and employ many thousand more men than these figures imply.

In January, 1896, the association moved its headquarters to the United States Hotel. At the end of the first year there was a total membership of 21 concerns. The association continued to hold its meetings at this hotel until the year 1899, when the headquarters were removed to the Revere House. Mr. W. O. Barbour of Barbour-Stockwell Co. was elected president at this time. In 1900, Mr. George B. Buckingham was elected president, and during his term our headquarters were removed to the Hotel Essex. In 1902, Mr. Henry Carpenter was elected president. During this year the by-laws were ammended so that the association could take in as members men connected with the foundry interests, for instance, pig iron commission merchants and foundry supply men.

In June 1902, the American Foundrymen's Association held its Annual Convention in Boston as guests of the New England Foundrymen's Association. There was $5,000.00 collected to entertain our guests, who numbered about 300, from all sections of this country. We gave them a warm time, and sent them away singing the praises of New Fngland's hospitality.

In 1904, B. M. Shaw was elected president, and our headquarters were moved to the Exchange Club. In 1905, Mr. John Magee of the Magee Furnace Co. was elected president.

A history of the New England Foundrymen's Association is a history of the foundry business, for the men who have stood together in this and kindred associations, who have broken bread and drank water and wine together are the ones who have made the greatest success in the foundry industry in this section. During this time we have seen great changes. Less than ten years ago we purchased all iron by fracture, but now this is changed, and from the old method of guessing what the iron was by the size of the granulation, we now buy by analysis.

The introduction of molding machines has been of great benefit, and the foundry business is passing through a period of change at this time. Centralization of products is being carried out, and the large shops where all kinds of work have been turned out are being superseded by the specialty shops which change enables those especially equipped, to make the work at a very much lower price than was possible by the old methods.

You still hear complaints that the foundry is still run on the old rule of thumb method, and that it is one of the least advanced of trades, that we are doing work today the same as our grandfathers were doing it, but if the man who makes these statements will study the subject, he will find that the world has moved even in the foundry industry.

This association has been a good thing for us all, and today we have ceased to fear each other as we did in the old days. By touching elbows and getting acquainted, we find that the foundrymen are not the rascals that we thought, but are all of one human family trying to do the best they can for themselves, but willing that the other fellow shall have an equal chance, provided he does business as a square and honest competitor should.

The mutual exchanges of ideas, the willingness to admit a fellow foundryman into our works to show him what we have that is new and progressive, to absorb new ideas from this interchange, and to talk over cost systems, which I still think is capable of more careful consideration in a great many instances, especially in the jobbing foundries—all of these points are for the lasting improvements of this great industry.

During these 10 years we have continued the policy outlined at its inception to make visits periodically to the large foundries and have papers of interest to the foundry industry read and discussed. In pursuance of this policy, we have visited during this time, the works of the George F. Blake Co., the General Electric plants, at both Schenectady and Lynn, the Deane Steam Pump Co., the Brown & Sharpe Co., Walker-Pratt, and various others. During the summer season we have had outings at Providence down the river, where the succulent clam and other good things have been enjoyed. We have also visited Nantasket, Bass Point, and other seaside resorts, forgetting for the day the trials and troubles of the foundry.

We have had papers read on almost every subject pertaining to the foundry industry, by both our members and prominent men from all over the United States. By this method we have kept in touch with the practice everywhere, and are enabled thereby, to take advantage of the improvements brought to our attention.

We have lost by death during this period, nine of our members, three of whom were with us at the first meeting. There has been a page set aside in our records for each. We have been represented by delegates at the funeral services, have sent flowers, and have done whatever we could to relieve the distress of the family.

In conclusion, I would say in the light of what we are doing, and the greater good we hope to accomplish in the future, can anyone operating a foundry afford to be outside the fold? If they hope for success in this world, and peace from the importunities of our secretary, they had better join with us now. In the language of our anonymous friend who has been sending letters lately to the Boston members, 'Get together," "Get together."

MILLIKEN PLANT FEATURES.

Milliken Bros., Inc., of New York, are preparing plans for a slip and float bridge at their plant now building on Staten Island, so that the largest car-carrying floats can be accommodated. This will enable all railroads entering New York harbor to deliver their cars on the tracks at the plant without the necessity of loading and unloading the freight into lighters.

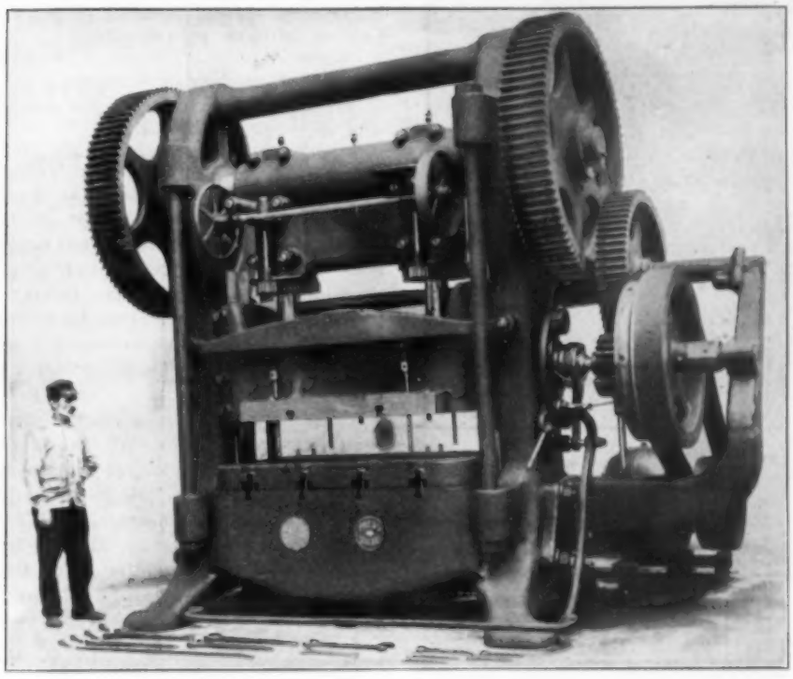
These improvements will be of most modern construction, with a bulkhead of concrete instead of timber. The slip will be wider than a single float in order to accommodate lighters, and a very large electric traveling crane will pass directly over both the float and lighter for facility in loading. The Staten Island works are within the lighterage limits, which will give all roads entering New York and vicinity terminal facilities at that point.

Additional contracts have been let in connection with the building of the open-hearth steel plant and rolling mill. Alexander Laughlin & Co., Pittsburg, will supply the open-hearth furnaces; the H. R. Smythe Co., Pittsburg, has been given the contract for the soaking pit furnaces.

The continuous heating furnaces will be furnished by the Morgan Construction Co., of Worctester, Mass.

FERRACUTE DOUBLE CRANK PRESS.

In the accompanying illustration is shown a large double crank press built for the General Electric Co. by the Ferracute Machine Co., of Bridgeton, N. J., from the designs of Oberlin Smith. This press is suitable for a variety of heavy cutting and forming work such as large armature plates, steel doors, ceiling and wall plates for architectural work, etc. A working ram pressure of 500 tons is used and the press weighs about 60,000 pounds.



FERRACUTE DOUBLE CRANK PRESS.

Some of the dimensions are as follows:

Distance between columns 76 inches.
Distance from bed to ram when up.....26 inches.
Stroke of ram..2-12 inchse or as ordered.
Total height of machine.... 12 feet.
Width of machine.. 13 feet, 6 inches.

The adjustment of the ram is unusually large, being 10 inches or more as desired. The two pitmans are of forged steel and are kept perfectly uniform in their motion when adjusting by cut spur and worm gearing as is shown. This motion is operated by a hand wheel at the left or by a motor which may be provided and placed on a shelf at the right hand end of the pitman. It can then be belted to a pulley shown on this end of the shaft or geared as desired. The fly wheel of the press is 40 inches diameter by 7 inches face and weighs about 1,100 pounds. The usual gear ratio of this type of press is 35 to 1, although it has been made as high as 50 to 1 and as low as 25 to 1. The speed of the press is usually 500 revolutions per minute and a 20 horsepower motor is used for driving.

A notable feature of the press is an improved friction clutch which can be so set as to run the ram continuously, or to stop it automatically at the end of the stroke or at any other point, by means of the hand lever shown in front and at the right hand side. The adjustment of this clutch is so delicate that the large gears on top can be moved ⅛ inch at a time. This power adjustment with hand control is of great convenience in setting dies as it avoids the necessity of pulling the press around by hand. Another new feature in this type of press is the twin-gear construction by which the main shaft is driven from both ends. This results in each gear and journal having but half the stress and torsional deflection that it otherwise would have. The gearing is cut from the solid and is of such ample dimensions as to be of great strength. The weight of the large gears is something over one ton.

Still another feature which has proved extremely satisfactory is the making of the pitman in one piece of great depth so that this in itself acts as a truss to keep the shaft from springing. The pitman is made in halves so that it can be quickly taken apart for inspection and for ordinary disassembling.

The press is equipped with upper and lower knockouts for combination cutting-die work. The lower portion of the knockout apparatus consists of a heavy plate beneath the bed which is raised by four rods from the ram. The latter carries several vertical posts that can be placed in any of the numerous holes through the bolster to suit any desired position in the dies. The upper portion consists of two heavy beams bolted to the columns which carry adjustable rods located at various points in the ram flange. The entire device can be removed if desired.

Presses of this type are made with various widths between the columns ranging from 4 feet, 4 inches to 12 feet, 4 inches in the clear. This enables sheets from 4 to 12 feet to be passed entirely through from front to rear.

A recent improvement not shown in the illustration consists of the widening out of the columns just above the bed. The columns also have 10 x 12 inch holes cut entirely through them. The clutch is placed higher than is shown in order to be out of the way. This arrangement enables long bars up to 12 inches in width to be passed through the machine from right to left. A press containing this feature is now being built for cutting and perforating heavy links for conveyor chains up to 1¼ inches thick.

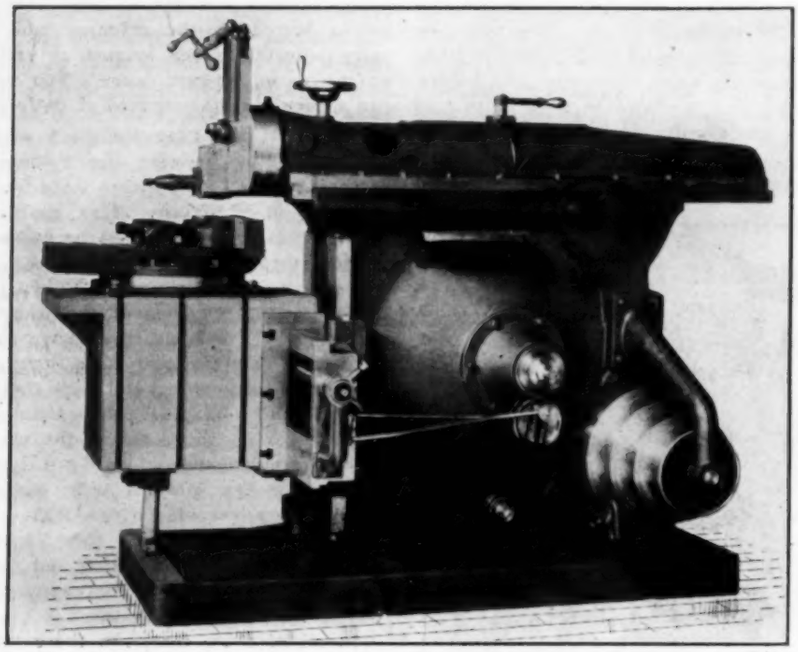
In all of these machines there is a great excess of belt power on account of the speed at the belt is run. In a press of narrower design made some few years ago for the Washington navy yard and used for drawing cannon cartridge shells it was found that a two-inch belt would do almost all the work for which a six-inch belt was provided. A few of the small sized shells were drawn with a piece of cotton tape, ¾ inch wide and 1-64 inch thick used as a belt.

The machine ran so easily that this belt kept everything in motion, although the work of drawing the cartridge was of course performed by the stored power in the rapidly rotating fly-wheel.

Welding By Acetylene.—A process has been developed by an Italian engineer for welding steel and iron, by means of acetylene gas. The heat produced by the combustion of acetylene and oxygen, mixed at the moment of burning, is estimated to about 7,200 degrees F. This temperature is much hotter than that of the oxyhydrogen flame, and is near that of the electric arc. The process is particularly applicable to the welding of metals and parts, which are not accessible to the usual method. Welding heat can be obtained in a short time, and the results are reported to be extremely good. The process is said to be very economical.

A HEAVY RAILROAD AND MANUFACTURING SHAPER.

The Cincinnati Shaper Co., of Cincinnati, has recently developed a 32-inch railroad and manufacturing heavy duty shaper. This machine is shown



NEW CINCINNATI SHAPER.

in the accompanying illustration. It is rigidly built to withstand the peculiar and excessive strains to which this type of tool is subjected, and is extremely powerful. The column is of unusual width and depth, is ribbed and braced internally and of such a form as to resist all strains. Projecting horns at the front and back give an unusually long bearing to the ram. This latter has a wide and long bearing in the column, and is of an approved form.

The rail is deep, heavy, ribbed horizontally, and strongly gibbed to the column. The cross traverse screw is provided with a graduated collar reading to 0.001 of an inch. It is provided with a variable automatic feed, which is changeable from nothing to full feed, while the tool is running. The head swivels to any angle, and is graduated. The down feed screw is provided with a graduated collar reading to 0.001 of an inch.

The journal of the main gear has two diameters, the inner end being twice the diameter of the outer end, thus overcoming any tendency to break at the junction of the gear and there is a third or outer bearing to the cone shaft.

The crank block is a steel casting, and is set well into the cup of the gear, permitting the rocker arm to travel close to the edge of the gear.

The machine may be used either in single or back geared form, the ratio of gearing in one case being 7.2 revolutions of the cone shaft to one stroke of the ram, and in the other thirty to one.

An outer support is regularly furnished for the table, and is provided with a base stiff enough to withstand the thrust put upon it, and the surface upon which the supports slide is truly parallel with the travel of the table.

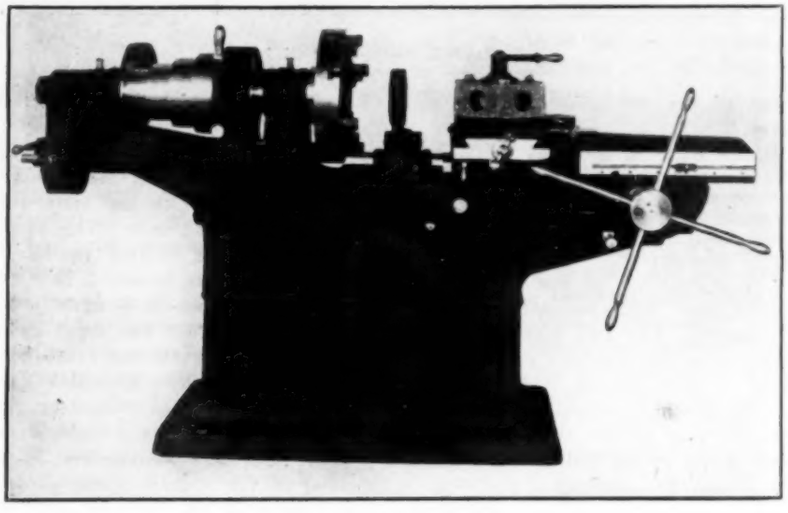
The machine has ball bearings underneath the elevating screw of the rail. The screw is of telescopic form, never recedes below the floor, and is out of the way of falling chips. The length of the stroke is changed from the working side of the machine, and its position may be changed by means of a hand wheel on top of the ram. These changes can be made while the machine is in motion or at rest. Some of the dimensions of the machine are:

	Inches
Extreme lengths of stroke	33
Greatest distance table to ram	17¼
Least distance table to ram	2¼
Vertical travel of table	15
Horizontal travel of table	32
Length of top of table	30
Width of top of table	16
Depth of table	20
Key-seating capacity diameter	4
Will take tool	1 x 2¼
Size of vise jaws	16 x 3½
Vise opens	12
Number of speeds to ram	8
Cutting strokes per minute, from	6 to 71
Weight of machine and countershaft, net	6,300 pounds.

A NEW TURRET LATHE.

The W. P. Davis Machine Co., Rochester, N. Y., has recently put on the market a 24-inch turret head boring lathe with geared friction head, which, in addition to the regular turret, is provided with a power cross feed, making it a very desirable machine for boring and forming all kinds of cast iron work.

The spindle is provided with a two inch hole through its entire length. The front bearing is four inches in diameter and six inches long. The back bearing is three inches in diameter and four and one half inches long. The machine has a four step cone pulley. The steps have diameters of 6, 8, 9½ and 11 inches, and are three inches face.



DAVIS TURRET LATHE WITH POWER FEED.

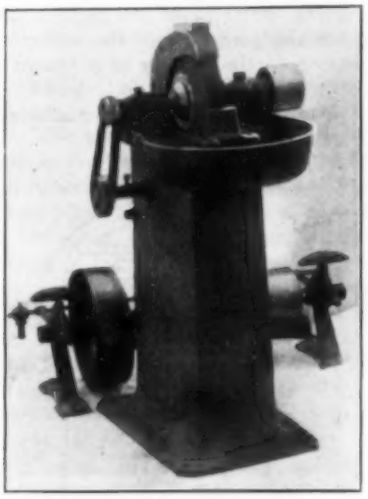
The turret of the machine is 12 inches, and is provided with six holes, two and one half inches in diameter. The turret slide is 32 inches long and 14 inches wide, and has a travel of 30 inches on the slide. Sixteen changes of speed are secured by means of two

drivers on the contershaft, and there are six instantaneous changes of feed for each speed by means of the geared friction head. The machine is provided with an independent, four-jawed, 18-inch chuck. By means of the power cross feed of the turret, work can be faced and formed at the same time as it is being bored. Forming of any description can be done by fastening the various tools on the sides of the turret. A guiding rest to support the boring bar when it is necessary is provided, and when not in use, this support can be swung back out of the way by merely loosening up one bolt. The approximate weight of the machine is 3,200 pounds.

THE STERLING TOOL GRINDER.

The Sterling Emery Wheel Mfg. Co., Tiffin, Ohio, has recently developed a new 14-inch tool grinder, which is shown in the accompanying illustration. It is simple in construction and rigidly built.

A 14 x 2 inch emery wheel of special



STERLING EMERY GRINDER.

material is used on the machine. There is no pump for use in wet grinding, but, instead, a special device on the inside of the column is arranged to spray a good supply of water on the wheel, while in operation. This device is driven by a belt from the end of the wheel spindle, as shown. On stopping the machine, the water all drains from the wheel.

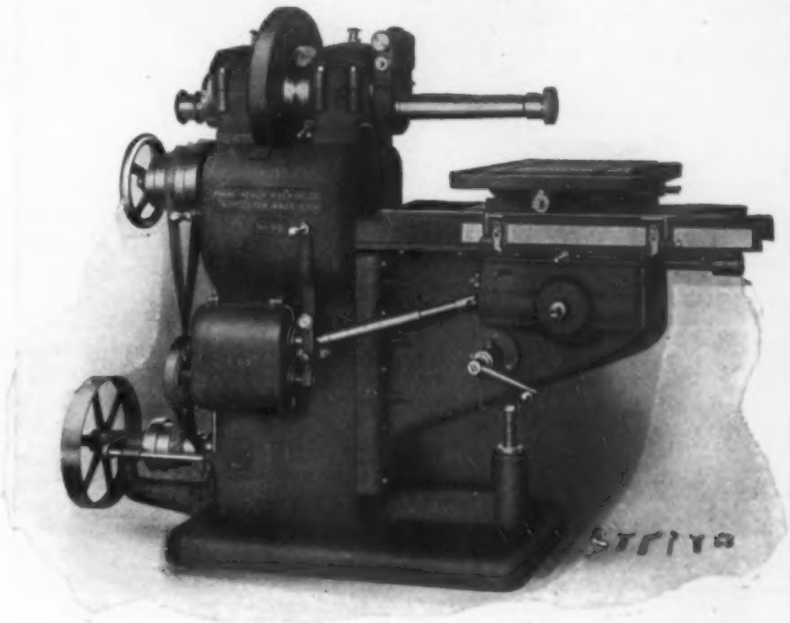
An efficient guard protects the wheel and an adjustable tool rest is situated in front of the wheel to facilitate grinding. The machine is arranged to be driven from a countershaft.

The annual convention of the Ohio Hardware Association will be held Feb. 27-8 and March 1 at Canton. The Berger Mfg. Co. has invited those in attendance to visit its plant.

THE HEALD CYLINDER GRINDER.

The Heald Machine Co., Worcester, Mass., has brought out a new grinder, which has been designed, not only for the correct finishing of gas and gasoline engine cylinders, but also for internal grinding on a large variety of machine parts whose shape makes it impracticable to rotate them as is necessary, according to the usual method of handling such work.

The process of finishing work by grinding possesses a number of advantages over the ordinary way of smooth boring and reaming to obtain a suitable finish. In the construction of thin cylinders, when the surface is finished by boring and reaming, there is a continual tendency for the metal to spring away from the cutting tool, and if there are hard or soft spots in the casting, it is practically impossible for the boring tools to cut a perfectly true hole. This is not the case, however, with grinding, as the emery wheel will cut to a perfectly true circle, whether the cylinders are hard or soft, light or heavy, with or without port holes, and the surface obtained is superior to that produced in any other way.



HEALD CYLINDER GRINDER.

The capacity of the machine illustrated herewith is holes from three to nine inches in diameter by fifteen inches deep. These dimensions are varied as necessary, however, to meet special requirements.

The tool is constructed with a main frame of column pattern, at the top of which there is mounted a grinding spindle carried in an eccentric head or sleeve. This eccentric head is made up of two eccentrics, one within the other. It rotates about a horizontal axis, giving the grinding spindle and wheel a planetary motion. This is a very effective device for bringing the holes to the correct diameter, and it also insures their being of a perfectly round and uniform diameter at all times.

On the front of the column is mounted a massive knee casting. It has a vertical adjustment of 4½ inches, and carries the main sliding table which travels forward and back in a line parallel to the grinding spindle. This table is made heavy and with ample wearing surface. It is of sufficient length to fully protect the ways in which it slides, from grit and dust. There is also provided a cross slide table for giving crosswise adjustment to the work with relation to the grinding spindle. The feed screw of this latter table is graduated to thousandths of an inch.

The use of the cross slide table enables two or more holes to be ground in one casting at a single setting, at accurate distances apart, and with a guarantee of correct alignments. This is a particularly valuable feature where duplex cylinders are to be ground. The cross slide table has a traverse of nine inches, and by its use, the expense of jigs and fixtures can be largely reduced.

The travel of the main table is automatic, reversing accurately at any desired point. The rate of travel is controlled by a change gear box at the front of the column. Three different speeds are available for every speed of rotation in the work.

The wheel spindle is hardened, ground and lapped, and runs in phos-

phor bronze boxes made dust proof and adjustable for taking up wear in a very simple manner.

The end of the wheel spindle is made tapering, to receive wheels mounted on collets, thus making it easy to change wheels at any time with the least possible trouble and delay.

The eccentric head, which carries the wheel spindle and extension sleeve is driven by a five-step cone pulley at the left through a single pair of gears. The head is fitted with a worm and star wheel feed, which can be operated automatically to feed the wheel into the work or withdraw it at any time if fed too deep.

At the rear of the wheel, and about

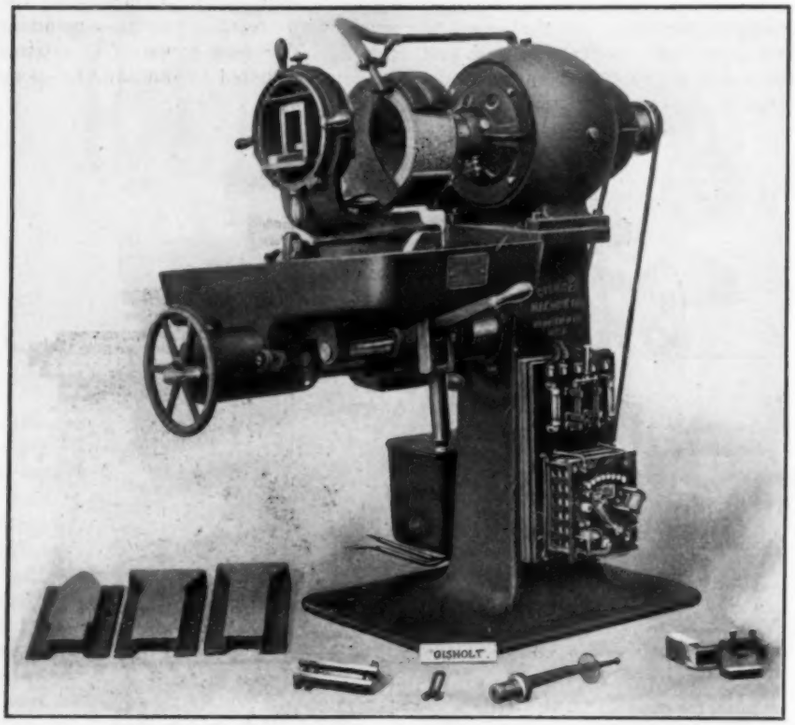


FIG. 1.—GISHOLT TOOL GRINDER.

on a level with the small pulley driving the grinding spindle, is mounted an arm carrying two idler pulleys, around which the belt runs. This provides sufficient "give and take" to enable the belt to follow this pulley through its circular path

If specified, the water supply for wet grinding can be furnished by a centrifugal pump mounted on a large tank at the base of the tool. Large channels are provided on both tables for taking care of the water.

The main table is 45 inches long by 13 inches wide, the finishing top being 22 inches long by 11 inches wide. The cross slide table has a working surface 20 x 14 inches. The greatest distance of the main table below the center of the grinding circle is 12 inches. The grinding wheels are 3½ inches in diameter and 3¼ inches thick.

GISHOLT MOTOR DRIVEN TOOL GRINDER.

A motor-driven tool grinder is one of the latest developments of The Gisholt Machine Company, Madison, Wis. The object of the grinder is to provide a moderate priced tool grinder that will take care of all the usual shapes of lathe and planer tools, and put a shop in a position where, with an ordinary man running the grinder, tools can be kept in the best shape, and the very best results can be obtained. The grinder should be kept in a tool room, in which all tools should be cared for and ground. It is a well known fact that hand grinding not only takes men away from their machines, but it produces a line of angles in the various tools following the ideas of the individual men. It is also well known that there is a proper angle for grinding these tools, and that when ground to this angle, they will give the best results.

The Gisholt Machine Company has determined by experiments and experience what are the proper angles for all various shapes of lathe and planer tools which are made. With each grinder is furnished a set of tools properly ground and a chart, showing the exact angles for each. All that the operator is required to do is, simply to place his tools in the tool holder, set it to the proper angle, which is easily done, and start his machine.

The best results can be obtained in the tool room by keeping tools of a kind in stock, so that one man can be employed constantly in grinding tools, and when men come to the tool room, they simply have to exchange dull tools for sharp ones. This system has been at work in the Gisholt shop for a number of years, and has proved its economy.

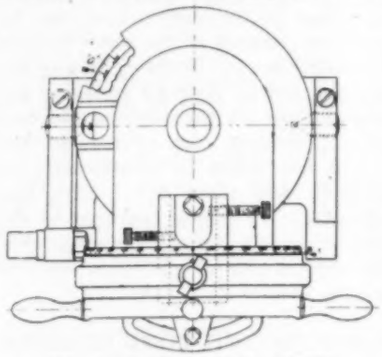


FIG. 2.—PLAN OF TOOL HOLDER.

The grinder is provided with a five horsepower direct current motor, fitted to run on a 110 or 220 volts circuit, at a constant speed of eighteen hundred revolutions per minute. The emery wheel is driven direct from the motor. The switch and controller of the motor are mounted on the column as is shown in the illustration.

The important part of the machine is

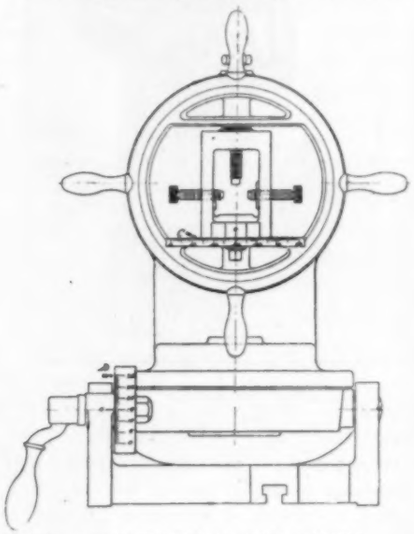


FIG. 3.—ELEVATION OF TOOL HOLDER.

the tool holder, which is shown in Figs. 2 and 3. A tool held in this holder may be moved about four different centers for the following purposes:

1. If the tool is bent, it may be moved thirty degrees on either side of the center to bring the face to be ground parallel to the face of the emery wheel. This is the only change required for bent tools. The tool is moved to the same amount as it is bent. This setting is designated in Figs. 2 and 3 by C.

2. A tool may be rotated through the full circle about its own axis as the

center. In this way the sides and top may be ground. This setting is designated by B.

3. A tool may be rotated through about three hundred and twenty degrees in a horizontal plane. This serves for grinding the angular faces of tools. This setting is designated by A.

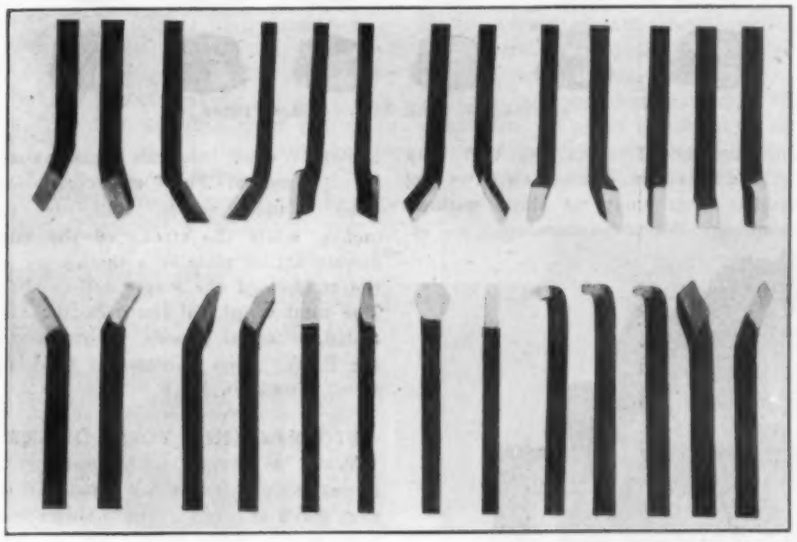


FIG. 4.— VARIETY OF WORK DONE ON GISHOLT GRINDER.

4. The entire tool holder may be rotated in the base to the amount of fifteen degrees on either side of the horizontal plane for the purpose of obtaining clearance on thread tools, without distorting the top angle.

The operation of the machine is exceedingly simple, and the working parts are well protected from grit and dirt. Tools can be mounted on it in a much shorter time than they can be ground by hand, and all tools will have the proper cutting angles.

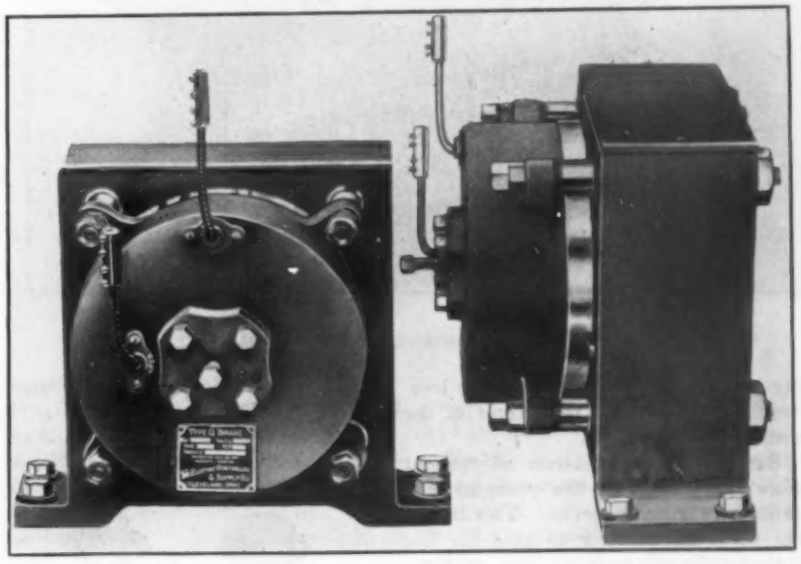
Fig. 4 shows the variety of work that can be done on this machine.

A NEW MAGNETIC BRAKE.

A magnetic brake is the latest production of the Electric Controller & Supply Co., of Cleveland. This is known as the type "Q" brake and is for use on electrically driven machinery of from one to 100 horsepower. Two metal friction plates are used which run in oil thus rendering the coefficient of friction constant under all conditions.

In all cases where electrically driven machinery requires frequent stops and reversals, the facility and speed of handling the material, and also the safety of the crane or other machinery employed, depends upon the accuracy and reliability of the brake. The braking force of the brake here illustrated is always a definite and constant quantity. It is applied axially and is balanced within the frame of the brake, thus allowing no blow or unbalanced thrust on the bearings of the motor.

The brake is released by an electro-magnet through a very small air gap. This operates quickly with a comparatively small current and without any hammer blow. The braking force is always maximum and equally effective in either direction of rotation. The heat generated in braking is carried away from the friction surfaces by the circulation of oil and is then radiated from the entire surface of the friction case.



EXTERIOR OF NEW MAGNETIC BRAKE.

The adjustment of the braking force is easily made by means of the adjusting screw in the center of the spring cover. When the total amount of wear on all of the plates equals ¼ inch, a new square plate can be placed in the friction case by removing the magnet case and two top studs. The brake is designed and tested to release on one half of full load current as a maximum. Due to the large pole area the brake does not drop back until about 1-10 full load current, insuring a continued release of brake until the current is entirely cut off.

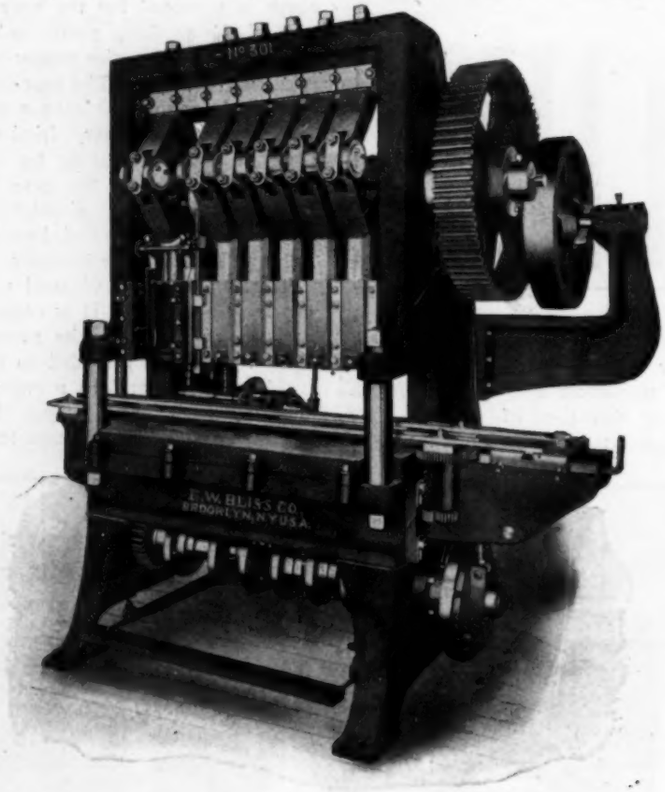
The coil is entirely enclosed, thus being protected from the weather, from mechanical injury, grounding and short circuiting. The working parts are also enclosed and weather proof, insuring good service under all conditions of weather. The friction case is a square open box with supporting lugs. A cover is provided for the easy inspection of the working parts, and with a small opening on the motor side for removing the hub. The essential parts contained within this case are as follows; square stationary friction plates, prevented from rotating by studs at the four corners of the case but free to move laterally; circular moving plates supported by and keyed to the hub and free to move laterally.

The hub is made of steel with keys cut from the solid. It is supported by and firmly keyed to the motor shaft. An oil slinger is provided to throw oil inside the case and to prevent it running out at the hub opening. Lubricating oil is placed in the case to a depth of ½ inch below the lowest point of the hub opening.

The electro-magnet is mounted on the studs which prevent the stationary plates from revolving. The coil of this magnet is form wound, thoroughly insulated and treated with a vacuum and drying impregnating process which excludes all moisture from the coil and makes it weatherproof.

NEW "BLISS" AUTOMATIC MULTIPLE SLIDE PRESS.

The press illustrated in the accompanying illustration is of new design and embodies all of the latest improvements in automatic gang presses of this class. It has a double action cutting and drawing slide with a lift-out, also five single action cutting and forming slides, each having an independent lift-out. The press is fitted with an automatic roll feed which takes the stock from the reel; also a grip and carrying feed which carries the first operation cup or shell from one to another of the five single action slides. The number of single action slides may be lessened or increased as the nature of the work demands.



BLISS MULTIPLE SLIDE PRESS.

Each slide has its own adjustment shown at the top of the press as well as its own gibbing device. This makes the press particularly adapted for the manufacture of such articles as lamp burner parts and similar work which is cut and formed, pierced, trimmed, stamped and finished in several successive operations, as a light operation with delicate dies is not thrown out of alignment by a heavy adjoining operation. The press is run at from 35 to 50 strokes per minute, and with six slides as shown it will produce from 210 to 300 operations per minute, without requiring any intermediate handling. Provision is made for rapidly adjusting the feed and working parts from one size to another. The small cuts give an idea of the shapes that can be produced in this press.

SAMPLES OF WORK DONE ON BLISS PRESS.

The number of operations that may be performed is limited only to the number that may be done without annealing. Where annealing is essential it is sometimes advantageous to draw the first operation in a plain press, after which the cup or shell is annealed. The roll feed on the automatic press is done away with in this instance and a dial feed substituted on which the first operation shell is placed and from which it is carried by the lateral feeding device the same as when it is used in connection with the roll feed. The rolls on the press illustrated will feed up to five inches long and up to five inches wide, making the largest permissible diameter of trimmed edge on die approximately 5 inches. The stroke of the outer double action slide is two inches, while the stroke of the inner double action slide is 4 inches, as are the strokes of the single action slides. The total weight of the press, as illustrated, is 12,500 pounds. It is built by the E. W. Bliss Company, 5 Adams street, Brooklyn, N. Y.

SAMPLES OF WORK DONE ON BLISS PRESS.

BIG MACHINE TOOL ORDER.

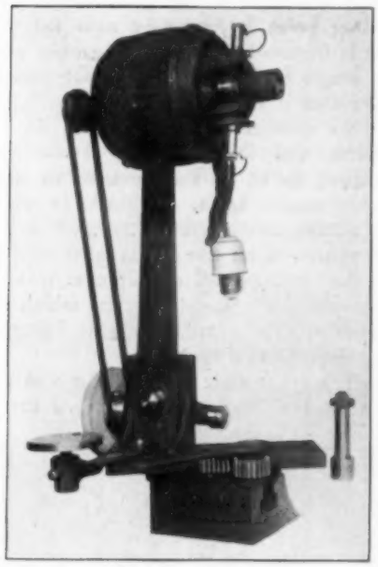
What is claimed to be one of the largest single orders for machine tools ever given at one time by a single company was recently placed by the Allis-Chalmers Co. of Milwaukee to cover a portion of the equipment for the new extensions to its West Allis Works, now under construction. Forty-two machine tools of extra heavy pattern, designed especially for use with high speed steels were ordered from several prominent builders of machine tools. The combined weight of these machines, without motors, is about 4,282,000 pounds or 2,141 tons. About seventy-five Allis-Chalmers motors of various sizes and aggregating a total of 1,200 horsepower, will be employed to drive these machines. Fourteen of the new tools are vertical boring and turning mills from 8 to 16 feet and of extra heavy design. There are five standard shaft lathes and two crank shaft lathes with a swing of from 60 to 125 inches and thirty feet between centers; eight planers of various sizes, all of which are the spiral geared type; a 260-ton armature press, also several drilling and boring machines, slotters, etc. In addition to the order for machine tools, thirty-four electric traveling cranes were ordered ranging from 2½-ton wall jib cranes up to 60-ton, 78-foot span cranes with ten-ton auxiliary hoist for the new foundry.

A MOTOR DRIVEN GRINDER.

The Mueller Machine Tool Co., Cincinnati, Ohio, has placed on the market a motor driven grinder, shown in the accompanying illustration.

This tool is built for all kinds of internal and external grinding. When lathe centers are to be ground, a compound slide is used, which, by means of a rack and pinion, operates on a 30-degree angle from the lathe spindle. The machine will thus grind centers to an exact 60 degree angle, without the use of a compound rest.

The tool can be placed on the tool slide of any swing lathe, and may be also used for internal grinding, by attaching a small arbor in place of the surface emery wheel. A vertical adjustment serves to bring the spindle into the center line of the lathe spindle. A small rest is fitted to the machine, as shown, and is used for truing up emery wheels, and also for sharpening cutters, saws etc.



MOTOR DRIVEN GRINDER.

The motor is mounted on a ribbed column, as indicated, and belted to the emery wheel. The power is obtained from the light circuit by means of an ordinary incandescent lamp socket.

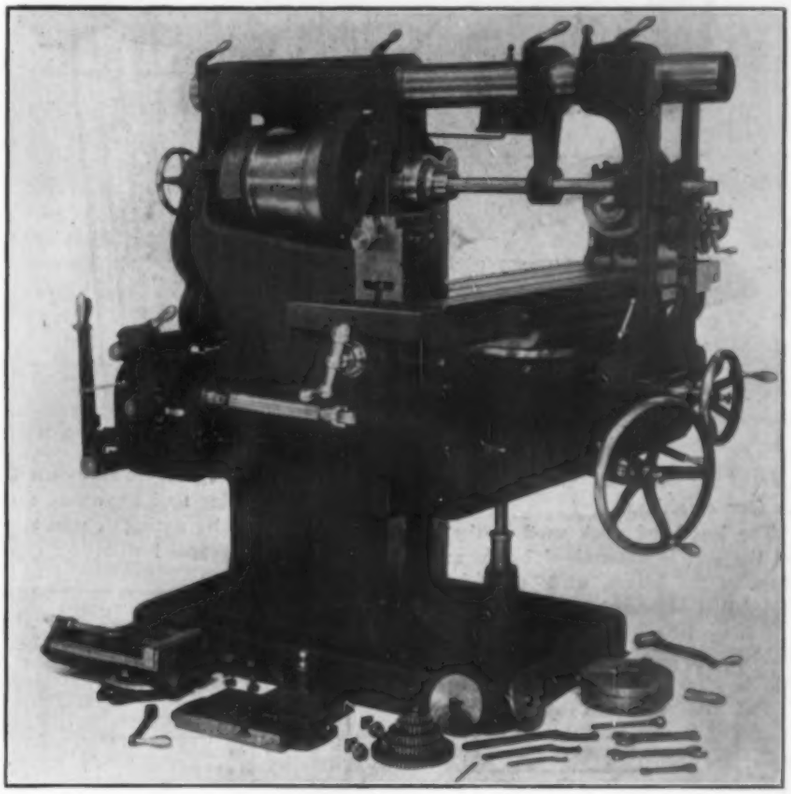
Provisions are made for taking up wear of the spindle, and also for keeping the latter dust proof.

The Amsler Engineering Co., Pittsburg, Pa., has issued a calendar. with a card 14 x 10¼ in. In the upper portion is mounted an illustration, representing a clay model or relief drawing in clay of the Amsler gas producer. There is little advertising matter printed about the illustration, and at the bottom, there is a very neat calendar of 3½ x 6¼ in., with white letters on a black ground.

NEW LINE OF BECKER-BRAINARD MILLING MACHINES.

The newly designed line of milling machines built by the Becker-Brainard Milling Machine Co., of Hyde Park, Mass., is shown in the accompanying illustration. This line has been entirely redesigned, and the accompanying illustration is applicable to all sizes of plain and universal machines.

The large machines are double back geared and all gears are cut from solid steel forgings. The feeds are driven by a train of spur gears and are placed close to the body of the machine so as to eliminate overhang.



BECKER-BRAINARD MILLING MACHINE.

The smaller machines are provided with twenty changes of feed and the large machines with twenty-four changes of feed. The feed gears are placed within the column and are easy of access. The knees of all machines are box shaped and are elevated by telescoping screws, and all operations of the machine are controlled by levers in front of the knee, convenient to the operator.

The machines also have a very wide range of feed dimensions, and in the universal machine, the table is clamped by four bolts to the saddle at any position. The plain machines are provided with saddles of equal length with the table, so that the table at all times has a long bearing.

With the gear ratios, the power that is obtainable in the drive, the feeds and also the strength to withstand strains, these machines are designed to withstand the service demanded by modern high speed steel cutters. The Chas. G. Smith Co., is agent for these machines in Pittsburg.

AN IMPROVED WIRE NAIL MACHINE.

An improved wire nail machine is built by Walton & Macke, Kokomo, Ind., and is illustrated herewith.

The No. 5 machine, which is presented in the illustration, is suitable for making steel wire nails from 1 to 7 inches in length, and from No. 6 to No. 2 wire gauge. The speed of the machine is 125 revolutions per minute. The floor space is 77 x 90 inches, and the approximate weight 6,000 lb. 1¼ horsepower are required, which is delivered by a five-inch belt. The crankshaft is three inches in diameter, and runs in four phosphor-bronze bearings.

The device for forming the heads of the nails is in the shape of a yoke fitted in the machine at an angle of five degrees, thus doing away with a pitman. The cut off and pinch levers are operated

by means of cams keyed to the crankshaft. The cutting knives are carried on rockers, which are fitted on the under side of the machine. These are adjusted in four directions.

WALTON & MACKE WIRE NAIL MACHINE.

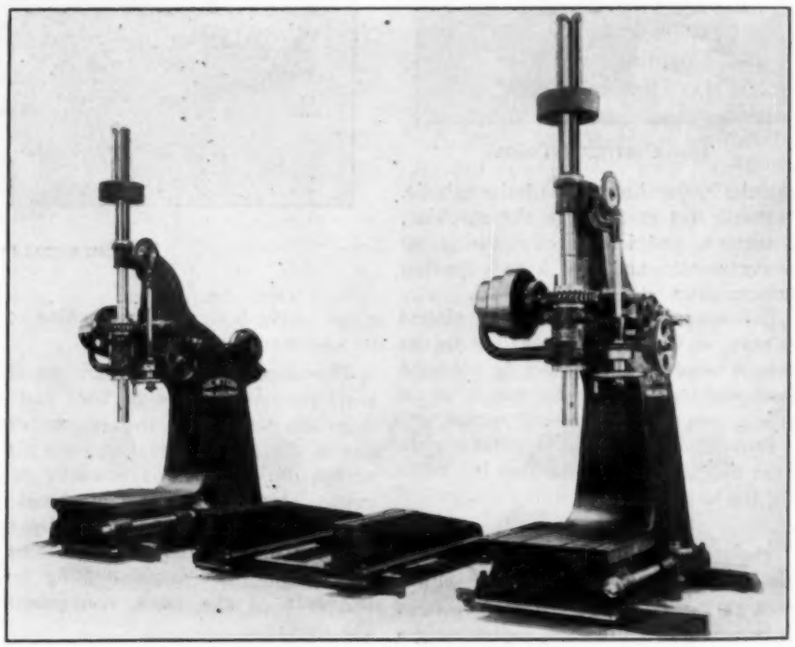
The length of stock used in the head of the nail is determined by an adjustment of the knives, while the length of the nail is regulated by shifting the feed rod to or from the center of the slotted disc on the end of the crankshaft, which can be clearly seen from the illustration.

The finished nails are removed by means of a positive kicker. Straightening rolls are provided through which the wire first passes. It is then firmly gripped by the heading dies, and the head is formed.

The next operation is the feeding in of a proper length to form the nail. It is then cut off and pointed in a single operation, one nail being made at each revolution. The machine is well balanced, permitting a high rate of speed without vibration.

A DOUBLE CHORD BORING MACHINE.

A double chord boring machine built by the Newton Machine Tool Works, Philadelphia, is illustrated in the accompanying engraving. This machine is intended principally for boring chords and I beams for bridges. The spindle is four inches in diameter and has an automatic feed of 32 inches. It is provided with three changes of feed through gearing, and is driven through a worm and wheel by means of a five-horsepower motor which is belted to the machine through a three-step cone pulley. This, with back gears gives six changes of speed. The motor used on the particular tool shown is a constant speed alternating current machine. Greater speed variation can be obtained by the use of a variable speed direct current motor.



DOUBLE CHORD DRILLING MACHINE.

The distance from the center of the spindle to the face of the column is 30 inches and from the end of the spindle to the work table 42 inches, the table being three feet square. The accompanying photograph was taken in the shop before erection and the machine as shown is ready to attach to a long bed built of I beams. The two supports shown between the two drills are to be used for supporting the work in the center.

A NOVEL METHOD OF CUTTING AN IRREGULAR BOX CAM.

The accompanying illustrations show an irregular box cam and a novel method for cutting the same. The idea was developed at the Cleveland works of the Chicago Pneumatic Tool Co.

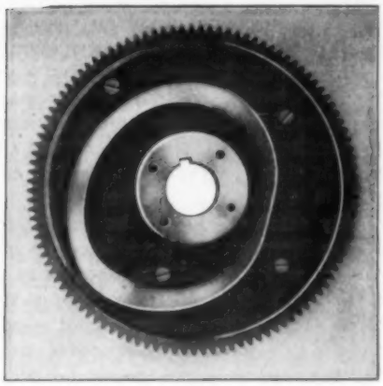
It will be observed that, at one point, the cam groove is located very close to the center of the gear, and at another point, it runs very near the rim. It is impossible to cut this groove with a single tool, as it is absolutely necessary that it be parallel.

No machine was adapted to do the work, and the following device was rigged up to do the work in an ordinary engine lathe: A block, in which a milling cutter was free to revolve, was mounted upon the cross slide of the lathe carriage. A master cam was attached to the mandrel, upon which the gear was mounted, the gear being in proper relation to it.

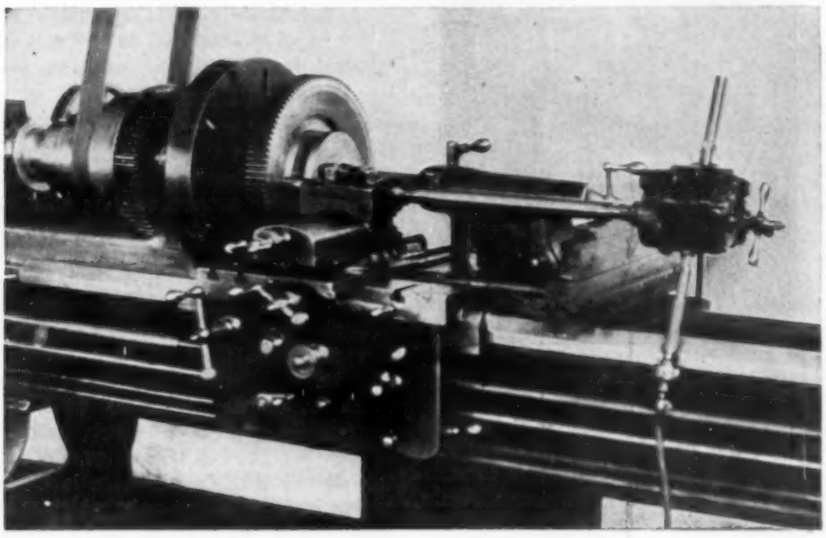
The cross slide of the lathe was disconnected from the cross feed screw, and as the lathe revolved slowly, the arbor of the milling cutter was kept in contact with the master cam by means of a weight fastened to the end of the

cross slide. The arbor in contact with the master cam was the same diameter as the milling cutter. This insured an absolutely parallel slot.

A pneumatic drill was used for driving the milling cutter. The arrrangement proved extremely satisfactory, as the speed was easily controlled, and there were no cumbersome belts or complicated machinery necessary. The fixture was made at an extremely low cost, and the setting up required no more time than an ordinary chucking job.



THE FINISHED CAM.



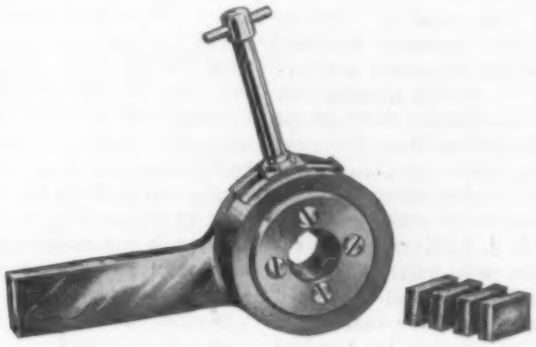
METHOD OF CUTTING CAM.

Record Order Booked:—The New York sales office of The Platt Iron Works Co. booked a record order for feed water heaters. The total capacity is 70,000 horsepower and the heaters are to be installed in the 36th street plant of the New York Edison Co. Negotiations for some very large pumping equipment for a plant at some distance from New York are nearing completion.

A NEW THREADING TOOL FOR USE IN LATHES.

The Standard Machinery Co., Bowling Green, Ohio, has just placed on the market the Wilson patent lathe threading tool. This is illustrated herewith. It is designed for cutting true threads in the lathe centers, using the lead screw if desired, and requiring but one operation. By using the chuck, rough bolts can be threaded the same as with a bolt cutter. As seen in the illustration, it consists of a stock for holding the dies, to which is fitted a shank for insertion in the tool post.

The dies are set in the stock, which is in two pieces, the outer piece being made to rotate slightly. A half turn of the handle on the upper side locks this rotating piece in any position desired. By moving it one way or the other, the dies are caused to approach or recede from the center, thus engaging or disengaging the piece of work operated upon. The device is not automatic in its operation. The machinist is required to open the dies at the end of the cut, and back the tool off the work. This tool will make a minimum diameter of thread of ⅛ of an inch. It is made in two sizes, the smallest of which will cut threads up to one inch in diameter and the largest up to 1½ inches.



WILSON LATHE THREADING TOOL.

INFLUENCE OF NITROGEN ON IRON.

Stahl und Eisen gives the results of some determinations on the influence of nitrogen in iron, made by H. Braune, who discovered alterations in the physical properties of the metal. An iron wire of the composition of 0.08 per cent carbon and 0.027 per cent nitrogen was nitrated with dry ammonia gas. After nitrating, the percentage of nitrogen was found to be 0.267 per cent. The original wire stood 15 or 16 deflections. The nitrated wire was unable to stand more than two or three. The process also increased the electrical resistance by 32.3 per cent. This was an increase of 3.23 per cent for each 0.01 per cent increase of nitrogen.

It was also found that the magnetic properties of iron were influenced by nitrogen in a similar manner to carbon; the residual magnetism was augmented, but the magnetic saturation was decreased. The wide divergences that were noted between the hysteresis figures of thin sheet metal, the analytic results being the same, were accounted for. The influence of nitrogen on the mechanical properties of the metal was investigated on a piece of weld iron. It was shown that the tensional strength was increased by nitrogen, at a rate nearly proportional to the increase in nitrogen, while the tension was decreased more rapidly than would correspond to the increase in nitrogen.

The quality of the iron (product of tension by tensional strength) is thus diminished by increasing amounts of nitrogen. The diminution, in the case of ingot iron, is much more considerable than the weld iron.

Italy has cut transportation rates heavily on agricultural machinery to stimulate home agriculture.

PANAMA CANAL

Conditions Discussed Before Milwaukee Metal Trades Assembly — New Officers.

(Special Correspondence.)

Milwaukee, Wis., Jan. 29. — About 100 of the leading founders and machinery builders of Milwaukee and vicinity attended the annual meeting and banquet of the Milwaukee Metal Trades and Founders' Association at the Plankinton house Jan. 24. The situation in Milwaukee metal working circles was succinctly summarized in the report of A. J. Lindemann, the retiring president, who referred to the efficacy of the labor bureau conducted by the association, and the remarkable freedom from strikes and labor troubles characterizing the preceding year. The bureau, he said, had won the confidence of employees, and many of the best mechanics now applied to it for counsel as to the best steps for them to take in matters affecting their present and future employment.

The Panama Situation.

O. P. Briggs, president of the National Founders' Association, did not appear, his absence being unavoidable, and the feature of the after dinner speaking proved to be the talk by S. L. G. Knox of the Bucyrus Steam Shovel and Dredge Co. of South Milwaukee, Wis. To some extent the talk was a reply to Poultney Bigelow's recent article on the Panama Canal.

"I do not believe the condition he outlined is the condition that exists," he said. "First, as to the feasibility of the canal: I don't believe there is an engineer who has visited the Isthmus, has been over the ground and has seen the conditions, who believes that question to be open to discussion. It is a great big job, and that is the only question about it. The question is only what kind of a canal to build. Leaving out health conditions, which will properly be taken care of, and some problems of about disposing of the soil which are no worse than lots of conditions in this country, the only difficulty about it is its bigness. If they build a lock canal, which the president favors, and which seems likely to be finally determined upon, the amount to be excavated is but two or three times that of the pyramids. The matter of controlling the Chagres river is not as bad as has been made out. All that is necessary is to build a lake to hold the total overflow. A place for this has been found, together with two or three spillway locations. I think that even though the canal were never used, the building of it would be amply repaid by the great reduction of trans-continental freight rates sure to ensue when it is finally opened."

Mr. Knox then referred to the inventory of machinery left by the French, an inventory now more or less well known to machinery men.

Purchases and Delays.

The purchases by the new commissions include 120 locomotives, sixty-one cranes, 1,000 flatcars and several thousand tons of rails. The heavy digging, in a stretch of three miles, will, he believes, require ten years. If a sea level canal is built, the equipment will have to be doubled.

His talk was an interesting commentary upon government control, for he showed that in one instance a requisition for $250,000 worth of material placed in June was not filled until the following February, while the red tape of the war department was being subserved. In the meantime the commission was practically helpless. Again, dredges were a number of times idle for three days while a pint of oil was being obtained from a storehouse in sight.

C. E. SAMMOND, PRESIDENT.

He believed Engineer Wallace had been greatly maligned, adding that the present commission is a business like one, and that genuine competition for equipment has been instituted. He spoke with especial praise of the introduction of trained railroad men in place of army officers on the work, and said that the clerks now brought onto the job were a great help in keeping things moving. The results in maintaining the health of the workmen have been most remarkable.

Trade School's Success.

James S. Church, managing director of the Milwaukee School of Trades, reported greater success than had been hoped for in the establishment of that institution, which opened Jan. 2 of this year, this being made possible by the prompt co-operation of manufacturers and employers, who manage the institution. The evening plumbing class has an attendance of forty, the day plumbing class nine, the evening pattern making class twelve, the day pattern making class five, the mechanical drawing and mathematics class eighteen and the electric class sixteen. He pointed out that in a shop, if the boy does not readily catch the instruction given him by the foreman, the latter becomes impatient, and a promising apprentice is often long delayed in acquiring the trade. He believed the school would meet such cases, and moreover gave the boy opportunities he would never obtain in a shop. He believed foreign importation of mechanics should be stopped by developing and educating them in this country.

Charles E. Sammond of the Stowell Manufacturing Co. was elected president of the association, W. J. Turner vice president and Clarence Falk of the Falk Manufacturing Co., treasurer. W. J Fairbairn of the labor bureau will be retained as secretary.

Novel Banquet Menu.

The banquet menu looked as though only a cast iron stomach could combat with it. It looked like an ironshop order for boiler connections, or hoisting apparatus for a mine; or an equipment of explosives. Kearney Krackers fought doggedly for a place with chain belt cream cheese, and the Neacy potatoes seemed little less attractive than did the fishplate a la Falk. Prescott deep rock was as much in popular favor as were the Greenslade stogies. The new chops a la Allis had Stowell trimmings, and following the core compound a la Obermayer came spherical reds, which were suspiciously like radishes, and elliptical greens, which might have been taken for plain string beans; and salted shot. Hoffmann bivalves held a top place with Barth garnish and Bradley bouquets. Bucyrus glace was good, though it is hard for most of those present to remember now just what it was. Maynard wafers were pretty good, and the Fawling crane, with Smith dressing, proved an excellent introduction to Lutter lettuce, Lange sauce, Vilter ice and Schwab assorted cake. Kempsmith Koffee was rich and settling, and the service being a la Johnson, any defects that might have existed in the so-called Lindemann menu were forgotten in the absence of any hitch in the agreeable programme of caring for the inner man.

BRITISH ADVANCES

In Iron and Steel Industry General—Iron Men Figure in Elections.

Birmingham, Eng., Jan. 19.—This has been an eventful fortnight for the iron trade. Following the recent quarterly meeting, this week we have the general elections, in which a number of local iron masters were interested as candidates, while hardly anything has been more prominent in the struggle than the bearing of tariff reform on the iron and steel trades in their various forms.

At the quarterly meeting, advances were the rule. The day before, the various market houses, issued circulars announcing an advance of 10s, making the basis price £9 per ton. Earl Dudley's brand becomes £9 12s 6d and Messrs. John Bradley's ordinary bars are quoted £9 10d. A similar step was taken the same day by the Unmarked Bar Association, which lifted prices from £7 to £7 10s. The curious circumstance about this advance is that the figure now declared to be the standard has already been passed in actual sales, and many firms are getting £7 7s 6d to £7 10s. For best qualities, higher prices are generally quoted. Thus the Shropshire Iron Co. is quoting its telegraph wire £13 10s, while its small bars largely used by chainmakers and which are of superior quality are quoted 5s dearer. Gas strip followed suit, with a rise of 10s, which makes the basis £7 10s to £7 12s 6d. Tin sheets were raised £1 per ton making the basis £28 per ton. Black sheets were at least 5s dearer, and for galvanized sorts, although the basis is only £12 2s 6d, sales are commonly effected at £12 12s 6d to £12 15s. Steel is dearer owing to an advance of steel workers' wages in the Cleveland district. All kinds of pig iron are slightly dearer, Northampton pig, for instance, being quoted £3 2s 6d, sales being effected at £3. Smelters are simply overwhelmed with orders, and are booked forward in most cases until June next. In regard to hematite pig, one fact speaks eloquently of the change: there were at the end of December 41 out of 86 furnaces on hematite against twenty last year. The trade generally looks wholesome and the prospects are good.

The relation of tariffs to trade has been a good deal debated in the election. But, so far, the verdict has gone overwhelmingly in favor of free trade. Among the victims is Sir Alfred Hickman, of world wide fame as a Wolverhampton ironmaster. Similarly, Ald Claughton at Dudley, Lord Dudley's steel works and colliery manager, and a very capable man, has been beaten in his own borough. The defeat is partly due to the booming condition of trade just now, which prevents voters taking seriously the warnings as to lost trade. Taking the country generally, the verdict has been decisive, free traders having won fifty seats against the tariff reformers' one.

CINCINNATI INDUSTRIAL BUREAU DINNER.

(Special Correspondence.)

Cincinnati, Jan. 26.—The Cincinnati Industrial Bureau held its annual meeting and dinner at the Business Men's Club, on Wednesday evening, Jan. 24. The occasion was one of unusual interest and was largely attended. William Lodge, of The Lodge & Shipley Machine Tool Co. presided as toastmaster. Mr. Lodge is also president of the bureau. He gave a short review of the new steel casting company enterprise which was organized through the efforts of the bureau. Ground was broken on the day of the dinner for the building of the concern and Mr. Lodge himself took out the first few shovels full of dirt on the site of plant, thus beginning the work.

After disposing of the routine work of the annual meeting, an exhaustive report of the past year's work was read by Secretary Will L. Finch, in which it was made plain that the bureau had done effective work in advertising and securing new industries for this city.

Mr. Moffett presented a paper on the subject of how to obtain capital for the financing of new industries, and for furnishing capital for plants contemplating enlargement and desiring to move here.

A. J. Conroy spoke of the need of more comfortable homes for the working men brought here from other places and outlined a scheme for the municipality to undertake, similar to the plans now being carried out in Glasgow and London.

J. T. McHugh spoke on the need of a belt railroad in this city on which industries could be located and have railroad facilities. This scheme is already well along, and much has been accomplished.

John Uri Loyd, the eminent scientist and author, made a most interesting address as to the possibilities of the future, for the city of Cincinnati.

The bureau has prospered so admirably and done such effective work during the past year that all of the officers were unanimously re-elected for the coming year.

It is estimated that 29 idle and new furnaces, with a total annual capacity of 2,253,500 tons will be blown in between Jan. 1 and Sept. 1, 1906.

THE RESULTS OF TECHNICAL EDUCATION IN ENGINEERING.[1]

BY PROF JOHN GOODMAN.

Technical education consists mainly in training students to regard the every day problems of their profession from a scientific standpoint. The aim of technical education is (1) to train the mind to deal systematically with any question or problem that may arise; (2) to search for the main points at issue after dismissing all irrelevant matter; (3) to train the imagination; (4) to impart the power of observation, also of analyzing intricate mathematical and scientific problems; and (5) to impart ideas of accuracy and definiteness of expression.

A technical training furnishes a student with a powerful weapon for dealing with original problems. Once having acquired the mental attitude of dealing with every question in a scientific spirit, he attacks his problem with a directness and certainty that are lacking in the untrained man. The mind of the trained man resembles a collection of pigeon holes, each reserved for some definite class of problem, and his first act on being confronted with a new one is to decide upon the pigeon hole to which it belongs. The method of attack then becomes clear, and unless the problem is one of great difficulty he readily obtains an exact, or at least an approximate, solution. Contrast this method with the chaos common to many engineering drawing offices, where, instead of grappling with the problem itself, the chief draughtsman gives instructions to hunt through hundreds of drawings to see if anything of the kind has been done before, and if lucky enough to find an instance bearing some resemblance to that required, it is copied or altered to suit, with the result that either too much or too little metal is probably used, but, worst of all, originality of design is stifled and progress much impeded.

Occasionally cases arise in which the theory is incomplete, or for other reasons it is not advisable to trust entirely to unsupported figures. Then, of course, reference to a previous successful design is not only desirable but is demanded by common prudence. The technically educated man, however, will proceed with his partial treatment so far as his theory permits, but will extract from the successful design the necessary data for a general treatment, utilizing these for a direct solution of similar cases in the future.

Do technically educated students rise to higher positions than similarly placed youths who have not had such a

1. Abstract of paper read before the Manchester (England) Association of Engineers.

training? Generally speaking, they unquestionably do rise to far better positions, and this by virtue of their technical attainments, although there are, of course, a vast number of cases in which men of little technical or even general education have risen by force of character to very high positions in the engineering world. Given, however, youths of good character and ordinary ability, no one who has even casually looked into the question can deny for one moment that the technically educated youth rises to a much higher position than the one who has not had the advantages of such a training.

It is quite an easy matter to pick out many instances of men who have been through technical institutions and yet have utterly failed to even earn a living wage at engineering. Such cases are sometimes cast in our teeth as a proof that technical education is a failure, but the fault is not always with us, but more often with the parents who insist on forcing their lads into engineering when they have not the least inclination for it. In some instances fond parents send their sons to engineering colleges in the hope that they will there get such a complete theoretical and practical training as shall enable them to avoid the dirty practical part in the works. Others, again, who recognize that their sons lack ordinary intelligence, vainly imagine that a technical training will compensate for their deficiencies and so enable them to successfully compete with others of average ability who have not been fortunate enough to get such a training. Needless to say this is not the stuff that engineers are made of, yet weaklings of this type are dragged through technical colleges, where they rarely succeed in passing an examination, and on leaving they are regarded as technically educated" by the man in the street, and naturally give rise to sarcastic remarks about the failure of technical education. This state of affairs will continue until colleges refuse to admit such men to their classes, but if by chance such a one should accidentally creep in it is plainly the duty of college authorities to advise the parents that there is no hope of ever making him into even a passable engineer.

Among the many advantages accruing from a technical education, perhaps the most important is that of enabling a man to gain experience, or, we might say, to benefit by his experience, and to make correct deductions from what he sees. Next in importance is his increased capacity of adjusting himself to necessary changes from one branch of the profession to another. This faculty of bringing himself into correspondence with his environment is largely due to the fact that the same fundamental principles underlie every branch of engineering; hence the change from one branch to another is simply a matter of picking up detail in the case of the technical man, whereas to the non-technical man it is a matter of learning a new trade or profession.

It is a matter of common knowledge that there are many shrewd practical men who will not employ men of high technical attainments. They openly state that they prefer draftsmen and managers who have very little, if any, scientific knowledge of engineering. This attitude is partly due to prejudice and partly to the fact that technically educated men often make themselves unpopular for one or more of the following reasons:—

(1) They suffer from swelled heads, and are very apt to compare their academic knowledge and methods with those of their employer or senior in the profession, to the disparagement of the latter. They forget that his theoretical knowledge has probably got rusty through giving attention to other but equally important work for many years. Even if their seniors have never been possessed of such knowledge they are nevertheless entitled to the highest respect in virtue of other knowledge they possess, of which the conceited youngster straight from college knows nothing. The college trained youth seems to forget, too, that the nomenclature of science today is very different from that in vogue a generation ago when their seniors were trained; hence many of the older engineers may have a very intimate knowledge of the theoretical side of engineering and yet know but little of the scientific technical terms used at the present day.

(2) The technical knowledge possessed by the raw student may not be in such a form as to be of much or of any service to him in actual engineering work. One occasionally meets highly mathematical men who lack all sense of proportion as regards the accuracy required for every-day purposes. They prefer a long, but apparently exact, mathematical treatment to a short cut which is sufficiently accurate for all practical purposes. Such men give one the impression that they would rather have a tooth drawn than make use of a convenient approximation. An actual case will perhaps best illustrate this point: The head of a firm of engineers gave instructions one morning to a newly appointed draftsman to order at once a length of chain for a 5-ton crane. On the following day the head inquired whether the chain had been ordered. "No," replied the draftsman, "I have not quite finished my calculations for arriving at the size of link required." On examining the draftsman's notes his chief found that he had been diving deeply into the intricacies of an extension of Winkler's hypothesis, covering many sheets of foolscap. "What's all this rubbish?" asked the enraged chief. "Don't you know the simple rule that the safe load in tons for a chain is equal to the square of the number of eighths of an inch in the link, divided by 10? Order a 7/8-inch chain at once," This highly mathematical draftsman scorned a rule-of-thumb method of this kind but nevertheless it gave the desired result in less than a thousandth part of the time required for the complete mathematical treatment, which, although a most elegant piece of work, was quite out of place in a commercial engineering drawing office. Teachers who have no practical knowledge of engineering are very often responsible for this state of affairs; they confine their lectures to the higher branches of the subject which interest themselves far more than their students. In the author's opinion nearly all teachers attempt work of too high a standard before the students have thoroughly grasped the earlier stages of the subject. By all means let the higher work be done, but not until the groundwork is thoroughly mastered.

(3) They lack business capacity and ignore questions of cost. They moreover have no knowledge of how to control and direct large bodies of workmen, and are not able to inspire those under their charge with confidence in their powers and respect for their authority, all of which defects are due to the fact that they have only been trained as hot-house plants in a college instead of getting the dual college and works training which is absolutely essential both for those who have to carry out engineering work and also for those who have to teach the principles that underlie it. One serious defect of the present system of training engineers is the tendency for college-trained men to cut short their practical training, which tendency is largely due to the baneful influence of unpractical teachers. One British university actually advertises in the engineering journals that "complete theoretical and practical training is given in the university." Another professor of engineering states "that one complete year in the workshop or in the office should be all that is required in the case of a student who has gone successfully through his college course." The author is old-fashioned enough to

believe that at least four years should be spent in the shops in addition to the time spent in the office.

(4) Opponents of techinal education often accuse colleges of inculcating unbusiness-like habits in students, and complain that the discipline as to punctuality of attendance at classes is not sufficiently rigid. That this is a just accusation in some instances must be admitted, but at the same time there are many institutions which do keep a careful watch on attendance, and necessary steps are taken, when occasion requires, to prevent slackness. Great discretion, however, is necessary in dealing with such questions, since students naturally resent being treated as schoolboys.

Other common complaints are, that engineering teachers ignore all questions of cost and time when lecturing on constructional and other problems; that the importance of the theoretical efficiency of plant is much over-rated, and its liability to wear and breakdown is ignored; and that instruction is not given on the management of works and men. It cannot be denied that to a large extent these complaints are real, but the difficulty of dealing with them is also great; indeed it is a question whether such matters could be adequately treated by means of lectures or otherwise in a place not devoted to business pursuits.

Vast sums of money are being spent on the technical education of engineers at the present time, but whether such money is being quite wisely expended is open to discussion. Technical instruction is required for two distinct classes of men. The one class is the rank and file from which draftsmen, managers and foremen are drawn. These should have a good grounding in the first principles of mathematics, mechanics, heat, chemistry, metallurgy, and electricity, yet their work does not call for a very extended knowledge of any one of these subjects. The other class is that of specialists who are required to give much time to the higher and more difficult problems of engineering and to devote a large portion of their lives to research work—privately or for firms. It is necessary for such men to go deeply and thoroughly into whatever branch they may take up; they require the general training we have outlined above as a foundation, after obtaining which they should proceed with their own specialized studies. Every engineering college in the country can give the general training, but as a rule the heads of engineering departments are, or ought to be, too fully occupied with lecturing and with the general work of the department to devote the necessary time to the higher work required by the special students. Moreover, no man can possibly have such a thorough knowledge of several special branches of engineering as to be able to give the necessary instruction in more than one or two subjects, hence we would urge that each engineering college, in addition to its general course, should lay itself out for specializing in one or two particular branches. At present more or less of this special work is done in the final year of the general course of instruction which is attended by all classes of students, with the result that some have to spend much of their time on branches of work that they are not interested in, while they do not get the instruction they are eager for in their own particular branch.

In one respect it is believed that much public money is being wasted in educating multitudes of evening students to a very low standard—far too low to allow of them making any use whatever of their smattering of science. We are fully aware that some work of this kind is necessary in order to discover latent ability and to act the part of a sieve, but we would urge that when the sifting process is complete those who have not been retained by the sieve should be discouraged from further pursuing such studies and should be advised to take up some other branch of work in which they may subsequently show up to advantage. The indiscriminate technical education of the masses to a low standard is, we believe, useless, and is indeed a waste of time and energy which would be far better expended upon those who show distinct signs of ability and who should be encouraged in every possible way to attain to the highest pitch of perfection as specialists.

The Colonial Steel Co., of Pittsburg, has decided to erect two 25-ton basic open-hearth furnaces, equipped with all modern appliances for economical and rapid production, including overhead cranes, charging machines, etc. Contract for the building has been let to the McClintick-Marshall Construction Co., calling for completion April 15, and it is expected the plant will be in operation within a short time after that date. The new 26-in., two high reversing blooming mill, with ample capacity for caring for the output of a number of furnaces, the size of those to be built, is already in operation.

The Capitol Lock-Nut & Washer Co., Columbus, O., is erecting a building 84 x 200 feet. Machinery requirements have been filled.

According to a report from the Department of Commerce and Labor the imports of iron ore were only 487,613 long tons in 1904 as compared with 980,440 long tons in 1903.

BOOK REVIEWS.

"Modern Machine Shop Construction, Equipment and Management," by Oscar E. Perrigo, New York. The Norman W. Henley Publishing Co. 10¼ x 7¼ inches. 342 pages. 208 illustrations. Cloth. Supplied by THE IRON TRADE REVIEW at $5.00.

This book is made up largely of a series of articles, which the author wrote for *Machinery*, describing various points in the construction of modern manufacturing plants, and contains a large amount of useful information, plans, figures, etc. The book follows, to a large extent, New England practice, and there are some points, which some of our progressive manufacturers would criticize; for instance, the location of pattern storage for a pattern shop adjoining the drawing room, thus introducing a serious fire risk in close proximity to the office. But the book certainly contains many valuable hints and suggestions, as to the arrangement of the various parts of the manufacturing plants, and the construction of same.

The description of the slow burning construction is well worthy a careful study, as is also the chapter on foundations. The work contains many hints, which would be of great value to anyone inspecting construction work, in connection with a manufacturing plant.

The subject of shop construction is included in the first 123 pages of the book. The second part deals with machine shop equipment, including racks, cupboards, bins and various means for saving time, both in the shop and drawing room. In this work, the word, "machine shop," is used in its proper sense, to include the entire plant. This section of the book occupies 110 pages.

The third section, dealing with shop management, includes carefully gotten up cost finding systems, and occupies about 100 pages.

This book should be in the hands of all manufacturers or shop managers.

"Practical Patternmaking," by F. W. Barrows, New York. The Norman W. Henley Publishing Co. 7½ x 5 inches, 326 pages, fully illustrated. Cloth. Supplied by THE IRON TRADE REVIEW at $2.00.

In reviewing this book, the editor read it through, and the further he got, the harder it was to decide what to say about the book, but, when turning back to the preface, the following words caught his eye: "I am not a believer in long distance instructions in patternmaking, or in any other trade, and, therefore, I don't expect, materially, to increase the number of competent patternmakers, by means of this book. I have been as concise in the statement of facts as possible, for the reason that these facts are, doubtlessly, known to many patternmakers, and any unnecessary elaboration would be a waste of time." He then goes on to

acknowledge the fact that one of the principal objects of writing the book was to bring in dollars.

The book certainly contains a large amount of valuable information, written in a pleasing off-hand style, the heavier matter, relative to craft, being interspersed.

It is certain that the book was not written primarily to instruct the apprentices for there is no treatment of elementary patternmaking, nor the fundamental principles of patternmaking. For instance, the important question of shrinkage is not mentioned anywhere in the book. The statements concerning machine tools and their uses are to the point, but the subject is treated all too briefly.

The examples given in the latter part of the book include the making of patterns for pulleys, sheave wheels, chain-blocks, steam engine patterns, gear patterns, patterns for propeller wheels, globe valves and other examples.

One section of the book is devoted to the subject of metal patternmaking and contains a number of valuable hints and suggestions. The fifth part of the book deals with shop mathematics. The sixth part deals with cost of patterns and pattern records.

The best that can be said of the book is that it is another book on patternmaking which represents one man's experience, and should be in the hands of all progressive patternmakers, alongside of the well known books by Dingey and Case.

OPEN SHOP EVERYWHERE.

The New York Metal Trades Association, representing firms employing 160,000 men in New York and vicinity, met at the Astor House, January 25, to inaugurate the "Open Shop" plan, referred to in THE IRON TRADE REVIEW of Jan. 25, and to amalgamate with the National Metal Trades Association. The meeting was not open to the public but at the close the following statement was issued:

"The New York Metal Trades Association unanimously adopted a resolution to amalgamate with the National Metal Trades Association, thereby establishing the New York Association as a local branch of the National Association. The territory to be covered by the New York association will include Greater New York, Jersey City, Hoboken, Newark, and towns in the immediate vicinity of these cities.

"Similar action has been or will be taken by the local metal trades associations in Boston, Worcester, Springfield, Philadelphia, Baltimore, Syracuse, Buffalo, Pittsburg, Cleveland, Cincinnati, Detroit, Chicago and St. Louis."

CRUCIBLE STEEL MIXTURES.

In the December issue of *The Foundry*, Robt. R. Barringer gave some mixtures for making crucible steel. The following mixtures were used for ordinary tool steel, carbon running from 0.75 to 1.10 per cent:

No. 1 Bessemer steel scrap...	30 pounds
Crucible file scrap.....	30 "
Misc. steel scrap	40 "
	100 "

Charcoal, 4 oz.

No. 2 muck iron (American)	20 pounds
Boiler punchings	35 "
Misc. steel scrap.....	45 "

Charcoal, 10-14 oz.
70 per cent ferro-chromium, 2 oz.

No. 3 boiler punchings.....	10 pounds
Saw Gummings	15 "
Washed Metal	10 "
Tool scrap	15 "
Muck iron (American).....	50 "

Charcoal, 6 to 8 oz.
Ferro-chromium, 1 oz.
Ferro-manganese, 2 oz.

Thus one will see in the ordinary steel many kinds of scrap may be used. For each ounce of charcoal used the increase in carbon is calculated at 0.04 per cent—the number of ounces used varying according to the crucible used; a new graphite crucible will add about 0.1 per cent carbon—hence less charcoal needed. Unless otherwise stated all "medicine" (charcoal, etc.) is charged with the mixture—100 pounds to a crucible.

For a Good Die Steel.

Muck iron (American).....	80 pounds
Saw Gummings	20 "
Charcoal	20 ounces
70 per cent ferro-chromium..	3 "
80 per cent ferro-manganese	5 "
Metallic tungsten	3 "

Special Tool Steel.

Muck (Swedish)	65 pounds
Fine tool scrap.....	35 "
Charcoal	20 ounces
Manganese oxide	12 "
70 per cent ferro-chromium..	5 "
Ferro-tungsten (80 per cent)	4 "

Lastly a mixture used for high-speed steel, an excellent grade is:

Muck iron (Swedish).....	45 pounds
"Special" tool scrap.....	40 "
Washed metal	10 "
Ferro-chromium	5 "
Ferro-silicon	1½ "
Clay	4 "

When melted crucible is "pulled," slag fluxed off, and

Ferro-manganese	6 ounces
98 per cent metallic tungsten	18 pounds
Flux	1½ "

added. The crucible is then placed in furnace for about thirty minutes.

The furnace of the Globe Iron Co., Jackson, O., has blown out for repairs, chief among which will be a new lining. The furnace has been in blast continuously for a long period, casting about 90 tons of high silicon iron daily.

One of the stacks of the Columbus Iron & Steel Co., Columbus, O., is out of blast for minor repairs which have been practically completed.

ENGINEERS' BANQUET.

The annual banquet of the Engineers' Society of Western Pennsylvania was held at Hotel Schenley, Pittsburg, Friday evening, Jan. 26, when 250 members dined and were merry. President Julian Kennedy of the society introduced Daniel Ashworth, the toastmaster, who was greeted with a storm of applause, and spoke to some length and grew eloquent as he sounded the praises of engineers and engineering.

Frank H. Taylor, second vice president of the Westinghouse Electric & Mfg. Co., had for his scheduled subject, "The Development of the Engineer," but this address was not confined strictly to the text and he was frequently interrupted by applause over his humorous references and hits at well-known engineers present at the banquet tables. Emil Gerber, assistant to the president of the American Bridge Co., made a brief address on "Chasm-Bridging," and was followed by James McCrea, first vice president of the Pennsylvania lines west of Pittsburg, and the guest of honor at the banquet. Mr. McCrea spoke of the great achievements in engineering he had witnessed during the 40 years he has been in the profession and said the next 40 years would undoubtedly produce even greater developments. "Anatomical Engineering" was the subject of remarks by Dr. William J. Holland, director of Carnegie Museum. George S. Davidson, the last speaker of the evening, aside from a few remarks by President Kennedy, had for his subject, "Engineering Ideals." Col. William Sibert, United States engineer asked to be excused from speaking.

NEW CALENDARS.

The Bon Air Coal & Iron Co., Nashville, Tenn., has issued quite a striking calendar, representing the casting house during casting. In the foreground is a figure of a man with a bar in his hand, standing before the pig bed, with the light shining up across him. Below the picture is a small calendar pad, with a black back ground and white letters.

The Champion Rivet Co., Cleveland, Ohio, has issued an exceedingly good desk or small wall calendar, composed of a bevel-edged card, 8 x 6¼ in., on which is mounted the picture of a girl labeled "Evelyn," which is taken from an original painting by H. Bondel. Below the picture, there is a neat calendar pad.

The Birmingham Engineering & Construction Co., Birmingham, Ala., has issued a calendar composed of a panel 14 x 6¾ in., containing the draped figure of a woman, entitled, "Autumn." Below the picture, there is a small calendar pad, with white letters on a dark back ground.

Industrial Securities Decline Slightly.

Trading on the New York exchange during the past week aggregated 9,240,900 shares, an amount of business exceedingly heavy in the absence of any stimulating developments or reports of deals such as are commonly employed to give the market a spurt of activity. The brisk movement, however, was almost entirely confined to the first half of the week, sales for the three days aggregating almost 6,000,000 shares. The market became less active on Thursday and assumed a feverish tone with sharp reactions in a number of leading securities, Friday's dealings were even lighter with Reading especially weak and Saturday's market was generally unsettled with Reading sustaining a decided break and the closing level being lower all along the line. Iron, steel and manufacturing securities generally suffered small declines as a result of the week's operations; in some cases these were only fractional, but in a few heavier losses were recorded. The only marked exception was Colorado Fuel & Iron, which netted an advance of five and one-half points, but its closing quotation was considerably below its highest selling mark of the week. Allis-Chalmers and American Car & Fdy. established small gains on heavy trading, but American Locomotive lost something of its recent advance and Tennessee Coal & Iron only held its own. Both the common and preferred stocks of the Steel Corporation were dealt in to a large extent, but both closed the week with a net decline, in the case of the common one and five-eighths points. Union Pacific, with slightly over a million shares, Reading about 800,000 shares, Amalgamated Copper with 750,000 shares and Southern Pacific with 455,100 shares with steel common were the market leaders. Money conditions were easy both at home and abroad with call money rates averaging 4 per cent.

THE LEADING INDUSTRIAL SECURITIES.

	Closing Quo. Jan. 20	Closing Quotation Jan. 27	Changes	Date of 1906 Ann. Meet.	Par Value	Capital Outstanding	Dividend Basis	Dividend Being Paid	Dividend Date Last Div. Dec.
Allis-Chalmers Co	23¼	25	+1½	Sept.	100	19,820,000			
Allis-Chalmers preferred	63⅜	64	+ ⅝		100	16,150,000	7 cum		Feb., 1904
American Can	12	11	−1	Apr. 24	100	41,233,300			
American Can preferred	70½	71½	+ ⅝		100	41,233,300	7 cum	5 Q.	Jan., 1906
American Car and Foundry	45¼	45⅛	+ ⅛	June 28	100	30,000,000			May, 1905
American Car and Foundry preferred	103	104	+1		100	30,000,000	7 n. c.	7 Q.	Jan., 1906
American Locomotive	76¾	74½	−2¼	Oct. 16	100	25,000,000			
American Locomotive preferred	119¼	118	−1¼		100	24,100,000	7 cum	7 Q.	Jan., 1906
American Shipbuilding	56½	57	+ ½	Oct. 2	100	7,600,000	4	4 Q.	Dec., 1905
American Shipbuilding preferred	104½	104½	.....		100	7,900,000	7 n. c.	7 Q.	Jan., 1906
American Steel Foundries	14¾	14⅝	− ⅛	Oct. 3	100	17,700,000			
American Steel Foundries preferred	52	51⅞	− ⅛		100	17,700,000	6 cum		Aug., 1905
Barney & Smith	20	20	.....	June 5	100	1,000,000			June, 1894
Barney & Smith preferred	123	122	−1		100	2,500,000	8 cum	8 Q.	Dec., 1906
Bethlehem Steel	34	33¼	− ¾	April 3	100	15,000,000			
Bethlehem Steel preferred	93	92½	− ½		100	15,000,000	7 n. c.	7 Q.	Feb., 1906
Bullock Electric preferred	114	114	.....	Oct. 2	100	1,000,000	6	6 Q.	Jan., 1906
Cambria Steel	35	36¾	+1¾	March 20	50	45,000,000	6	3 S. A.	Feb., 1906
Cambria Iron	49¼	50	+ ¾		50	8,468,000	4	4 S. A.	Jan., 1906
Colorado Fuel & Iron	72⅞	78¼	+5½	Oct. 15	100	30,132,000	7	.....	Apr., 1902
Wm. Cramp & Sons Ship & Eng. Bldg. Co.	28	28	.....	May 31	100	6,098,000	5	.....	Nov., 1902
Crucible Steel	16¾	16⅞	+ ⅛	Oct. 17	100	25,000,000		.....	
Crucible Steel preferred	80	80	.....		100	25,000,000	7 cum	.....	Sept. 1903
Empire Steel	6	6	.....	Feb. 28	100	2,281,400		.....	
Empire Steel preferred	37	36	−1		100	2,500,000	6 cum	3 S. A.	Jan., 1905
Fay & Egan	95	95	.....	Feb. 20	100	1,000,000	5	5 Q.	Nov., 1905
Fay & Egan preferred	120	120	.....		100	1,000,000	7 cum	7 Q.	Nov., 1905
General Electric	178	177¼	− ¾	May 8	100	48,256,050	8	8 Q.	Jan., 1906
International Pump	35	32	−3	June 5	100	12,282,500		2	July, 1905
International Pump preferred	85¾	84	−1¾		100	8,850,000	6 cum	6 Q.	Feb., 1906
Lackawanna Steel	81	81	.....	March 14	100	34,971,400		.....	
Lake Superior Corporation	22⅞	21⅛	−1¾	Oct. 3	100	40,000,000		.....	
Niles-Bement-Pond	121	121	.....	Feb. 7	100	5,000,000	6	6 Q.	Dec., 1905
Niles-Bement-Pond preferred	103⅝	103⅝	.....		100	2,000,000	6 cum	6 Q.	Nov., 1905
Otis Elevator Co	59	58	−1	March 19	100	6,350,300		2 A.	Apr., 1905
Otis Elevator Co. preferred	106	106	.....		100	5,589,500	6 n. c.	6 Q.	Jan., 1906
Pittsburg Coal Co	16⅞	16⅞	.....	Feb. 12	100	30,135,000		.....	
Pittsburg Coal preferred	61½	61	− ½		100	30,716,200	7	.....	Apr., 1905
Pressed Steel Car	62⅛	62	− ⅛	Feb. 21	100	12,500,000		3	Aug., 1904
Pressed Steel Car preferred	103¾	104	+ ⅛		100	12,500,000	7 n. c.	7 Q.	Feb., 1906
Pullman Palace Car	243	246½	+3½	Oct. 18	100	74,000,000		8 Q.	Feb., 1906
Railway Steel Spring	61	61⅛	+ ⅛	March 1	100	13,500,000		4 S. A.	Oct., 1905
Railway Steel Spring preferred	105¼	106½	+1¼		100	13,500,000	7 cum	7 Q.	Dec., 1905
Republic Iron & Steel	36⅜	35½	−1	Oct. 17	100	27,352,000		.....	
Republic Iron & Steel preferred	108	106⅝	+1⅛		100	20,852,000	7 cum	7 Q.	Jan., 1906
Sloss-Sheffield	93	90	−3	March 14	100	7,500,000	5	5	Jan., 1906
Sloss Sheffield preferred	106	106	.....		100	6,700,000	7 n. c.	7 Q.	Jan., 1906
Tennessee Coal & Iron	159	159	.....	May 15	100	22,552,800		4 Q.	Jan., 1906
U. S. Cast Iron Pipe & Foundry	52½	51½	−1	June 27	100	12,500,000		2	Jan., 1906
U. S. Cast Iron Pipe & Foundry preferred	96⅜	96⅝	+ ⅛		100	12,500,000	7 n. c.	7	Feb., 1906
U. S. Steel	46	44¾	−1⅛	April 16	100	508,302,500		.....	Dec., 1903
U. S. Steel preferred	112¾	112	− ¾		100	360,281,100	7 cum	7 Q.	Nov., 1905
U. S. Steel 5's	99⅜	99½	+ ⅛		100	463,798,000	5	5 A.	
Virginia Iron, Coal & Coke	54¾	54½	+ ¼	Sept. 18	100	8,641,600		.....	
Westinghouse Electric	173	168	−5	June 27	50	20,996,350	10	10 Q.	Jan., 1906
Westinghouse Air Brake	150	152½	+2½	Oct. 2	50	10,990,450	20	20 Q.	Jan., 1906

FINANCIAL NOTES.

Recent dividend declarations include the following: Pressed Steel Car Co., regular quarterly preferred 1¾ per cent, payable Feb. 23; American Radiator Co., regular quarterly preferred 1¾ per cent, common 1 per cent, payable Feb. 15 and March 1 respectively.

The Westinghouse Electric Co., has sold to Kuhn, Loeb & Co., $15,000,000 convertible 5 per cent bonds, subject to the right of stockholders to subscribe at 98 and accrued interest. They are secured in other ways than by mortgage on the property of the company. The proceeds of these bonds will be used to retire all outstanding commercial paper of the company and to provide ample capital for extensions and the caring for the company's increasing business. After Jan. 1, 1910 they may be converted into assenting stock of the company at 200, and after Jan. 1, 1912 they may be redeemed at 105 and accrued interest.

NEWS FROM MANY INDUSTRIES.

New Buyers:—

The Taylor's Valley Iron Co., Nashville, Tenn., has been incorporated with $40,000 capital stock.

The Elwood Heater Co., Elwood, Ind., has been incorporated to make stoves, heaters, furnaces, etc., and run a general foundry. The capital stock is $50,000 and the incorporators are: Daniel Spicher, L. D. Miller and Geo. Fahl.

The Whitney Machine Co., New York, has been incorporated to manufacture machinery, tools, hardware, etc., with a capital stock of $20,000. The incorporators are: J. Edward Whitney, Boston; Seymour K. Fuller, Brooklyn; and George C. Franciscus, New York.

The Clapp-Reynolds Foundry Co., Middletown, O., has been incorporated with $20,000 capital stock by W. W. Reynolds, H. J. Clapp, E. M. Reynolds, C. F. Clapp and R. J. Kaser.

The Rockford Tool Co., Rockford, Ill., has been incorporated with a capital stock of $10,000 by Charles Rystrom, Swan F. Anderson, and Elmer Lutzhoff.

The Hoist Co., New York, has been incorporated to manufacture hoists and hoisting machinery. The capital stock is $50,000 and the incorporators are: B. Franklin Mahler, 20 South William street; Frederick W. Lorenz, 115 Liberty street; Charles C. Littlefield, 35 Cortlandtstreet; and William L. Bratton, 126 West Thirty-fourth street, all of New York.

The Porter-Cable Machine Co., Syracuse, N. Y., has been incorporated with a capital stock of $5,000 to operate machine shops. The incorporators are: Raymond E. Porter, Herkimer, N. Y., Frank Cable and George G. Porter, both of Syracuse.

The Libby Valve & Packing Co., New York, has been incorporated with a capital stock of $25,000 to manufacture packing, valves, metal castings, etc. The incorporators are: Richard O. and Lilly D. Libby, Ansonia, and Louis W. Boyer, 22 West Twenty-eighth street, New York.

The New Century Wire Fence & Post Co., Toledo, O., has been incorporated with $20,000 capital stock by Owen Blackmore, Charles F. Black, Edward Tait, Frank E. Humphry and William E. Cordile.

The Felker Bros. Mfg. Co., St. Paul, Minn., has been incorporated to manufacture structural sheets with a capital of $20,000. The incorporators are: Lewis H. Felker, Albert G. Felker and D. Leighton Miller.

The Lay-Wilson Foundry & Machine Works, Aurora, Mo., has been incorporated with a capital stock of $50,000 by D. B. Lay, S. E. Lay, George Wilson and others.

The Warren Co., Camden, N. J., has been incorporated to conduct a general mechanical engineering, brass founding and metal working business. The capital stock is $125,000 and the incorporators are: John A. MacPeak, Geo. H. B. Matrin and F. R. Hansell, all of Camden.

The Jellico Foundry & Machine Co., Memphis, Tenn., has been incorporated with a capital stock of $25,000 by W. P. Richards, W. T. Barker, Wm. Brown, O. French and A. T. Richards.

The Cragin Iron Foundry Co., Camden, N. J., has been incorporated to manufacture machinery, castings and other foundry products. The capital stock is $125,000 and the incorporators are: Morgan J. Cragin, Joseph H. Carter and Alexander H. Heyman, all of 419 Market street, Camden.

The Huettel Coal & Coke Co., Wise, Va., has been incorporated with $50,000 capitalization by Gotthard Huettel of Norton, Va., and R. P. Bruce and W. F. Bond of Wise.

J. W. Kemmerer, of Bittenbender & Co., is organizing a company with a capital stock of $150,000 to operate a part of the old plant of the Lackawanna Iron & Steel Co., Scranton, Pa., and to install a puddling and rolling mill and other departments on property which has recently been purchased from the company. It is proposed to put up a steel addition, 100 x 200 feet to the largest building and to use same as the rolling mill. The plant will be operated by 750-horsepower engines and boilers and, it is expected, will produce about 2,000 tons per year. The manager of the new company will be Willis D. Kemmerer, son of John W. Kemmerer.

The Perry-May Mfg. Co., Elyria, O., has been incorporated with a capitalization of $100,000 for the manufacture of brass and steel screws, nuts and special parts.

The American Clay Machinery Co., Bucyrus, has been incorporated with a capitalization of $500,000 by J. E. Morley, R. T. Sawyer, E. H. Foote, C. F. Taplin and C. H. Gale.

The Elizabethport Brass Foundry Co., Elizabeth, N. J., incorporated for $25,000, by Frank J. Freund, and Charles F. Hinde of New York and Walter J. Rose of Elizabeth.

The Nordberg Manufacturing Co., of Milwaukee, Wis., formed sixteen years ago, has increased its capital stock from $250,000 to $1,250,000.

New Construction:—

The Bucyrus Steel Casting Co. has awarded the contract to the Indiana Bridge Co., Muncie, Ind., for the structural work of the new steel foundry which it will erect during the spring. The building will be 145 x 300 feet, modernly equipped, and will be ready for operation late in the year.

The North Lebanon Foundry Co., Lebanon, Pa., has completed additions which double the capacity of its plant in brass and iron castings. J. H. Wilborn is superintendent.

The Western Machine & Tool Wks., Holland, Mich., concerning the report that it is to erect a new foundry, states that it will not build until late in the summer, if at all.

Woodruff Bros. have withdrawn from the Winder Fdy. & Machine Works, Winder, Ga., and will begin at once the erection of a foundry and machine shop under the name of the Woodruff Hardware & Mfg. Co.

The Donaldson Iron Co., Emaus, Pa., is to erect a large additional foundry which will enable it to produce pipes up to 36 inches in diameter.

The Universal Castor & Foundry Co., Newark, N. J., is planning the erection of an additional three-story building in the spring. It recently completed extensive improvements, including a large three-story building for the pressed steel department and storage purposes and an addition 50 x 100 feet to the foundry.

Frazer & Jones have secured a site at Solvay, Syracuse, N. Y., upon which they will erect a number of buildings to be used for foundry purposes.

The Menominee Electric Mfg. Co., Menominee, Mich., will erect a new plant, the main building of which will be 62 x 335 feet, on a site recently purchased. Orders have been placed for all equipment.

The new iron foundry at the Brooks plant of the American Locomotive Co., Dunkirk, N. Y., which is now nearing completion, covers a trifle more than 2 3-5 acres of ground. The main structure is 175 x 650 feet.

The American Radiator Co. has let contracts for a number of additions to its plant at Springfield, O. The machine shop will be extended by the erection of a two-story building 70 x 100 feet and the foundry by a one-story structure 60 x 100 feet. They will be of brick and steel construction.

The Hart Grain-Weigher Co., Peoria,

Ill., has contracted for a new foundry building 50 x 132 feet.

The Crestline Mfg. Co., Crestline, O., manufacturer of brass goods, pumps, etc., will erect a building 40 x 100 feet to be used as a warehouse and for storage purposes, thereby giving more room for the manufacturing departments.

The Ohio Structural Iron Co., Sandusky, O., will erect a 50 x 40 foot addition to its plant to take care of the rapid increase in the demand for its architectural iron work and iron fencing.

An appropriation of $2,590,000 for the erection of 12 bridges has been recommended to the City Council by the Bureau of Engineering of the Department of Public Works, Chicago. The plans are that eight will be of the bascule type and four fixed spans where the river is unnavigable. About $946,500 will probably be used this year.

The Minster Machine Co., Minster, O., is in the market for a 60-inch cupola, two traveling cranes and a 10 or 12-foot, two head, boring mill with which to equip a new foundry. The contract for the construction work has just been let.

Harry P. Saunders, Philadelphia, Pa., is in the market for an 80 to 100 horsepower slow speed Corliss engine, a 125 horsepower water tube boiler, a 70 kilowatt generator and other minor power plant equipment. This machinery will be installed in a new factory building 68 x 132 feet.

The Joliet Bridge & Iron Co., Joliet, Ill., will make extensive improvements to its plant this spring, to cost in the neighborhood of $50,000. Some of the equipment has already been purchased from the Cleveland Punch & Shear Works Co., Cleveland, but more will be needed as soon as definite plans have been made.

The Gould Coupler Co., Depew, N. Y., manufacturer of bolsters, friction draft gear and other locomotive and railroad castings, is adding a 172 x 372 foot building to its open-hearth steel plant, which will be equipped with two 35-ton and two 10-ton electric cranes. Two Ingersoll-Sergeant direct connected, electrically driven air compressors will be installed in the laboratory which has just recently been completed.

The Victor Safe & Lock Co., Cincinnati, is to erect a $250,000 plant on a site recently purchased in Norwood, a suburb, directly opposite the new plant of the Schreiber Iron Works. Plans are being prepared and building operations will begin as soon as the weather is favorable in the spring. The first building will be 100 x 400 feet, equipped for the manufacture of bank fittings. It is also probable that the completed plant will include a steel foundry and a mill for the making of plates and angles.

The Homestead Realty Co., Homestead, Pa., has been awarded the contract for the erection of 100 frame houses for the United States Steel Co. in that city at a cost of $150,000.

The Crane's Nest Coal & Coke Co., Georgel, Va., is soon to close contracts for the immediate building of 150 coke ovens.

The Nashville Machine Co., Nashville, Tenn., has increased its capitalization to provide funds for the erection of a large foundry on the belt line in that city.

The Esser Coal & Coke Co., Esserville, Va., is to have 100 new coke ovens constructed at its plant at Esserville.

Contracts have been let for a part of the construction of the Firth-Sterling Steel Co.'s new plant near Washington. The William B. Scaife & Sons Co., of Pittsburg, is to erect the steel buildings and the contract for furnaces, which does not include those of the open-hearth type, has been granted to Wm. Swindell & Sons, also of Pittsburg.

General Industrial Notes:—

The plant of the Johnson Forge Co., at Wilmington, Del., has been acquired by a company of which C. H. Zehnder of Philadelphia is president and treasurer, and early in February will be put in operation. The works, which are located on the B. & O. with connections from the Pennsylvania lines and the Philadelphia & Reading, have an annual capacity of about 30,000 tons of refined merchant iron of a high grade. William D. Zehnder is vice president, A. C. McFarland secretary, George Catterall superintendent, and W. G. Williams sales agent. E. M. Zehnder, general superintendent of the Scranton Bolt & Nut Co., will have general supervision of the plant.

Alex B. Burns, secretary and general manager of the Burns Boiler & Mfg. Co., West De Pere, Wis., denies that there is any foundation for the widely circulated report that his company contemplates moving to St. Paul.

The Electric Cable Co., Bridgeport, Conn., has been formed to succeed the Magnet Wire Co. and the Peerless Electric Co., both of New York. A large factory is nearing completion in Bridgeport for the manufacture of magnet wire, field and armature coils and voltax, a new non-rubber insulation. The New York office will be at 42 Broadway. The officers are E. W. Moore, president; F. H. Cowles, vice president; J. Nelson Shreve, treasurer; and H. S. Williston, secretary; with the following additional directors; Alfred Skitt, John Carstensen and R. A. Cowles of New York, G. Tracy Rogers of Binghamton, N. Y., and Geo. C. Edwards of Bridgeport.

The E. M. Huenefeld Co., Cincinnati, which recently incorporated to succeed to the business of a company of the same name, is soon to move into its new building at Spring Grove Ave. and Strait Street, where six stories with a double basement will give the concern about 180,000 square feet of floor space. The power plant will be located in an adjoining building and all machinery will be electrically driven. The general foundry business of the company at Augusta, Ky., will be continued and all necessary castings will be made at that place.

The Chesapeake Iron Works, Baltimore, has increased its capital stock from $15,000 to $50,000, to accommodate the increased demand for its structural and ornamental iron products. Its success during the three years of its existence has been largely due to the heavy building following the fire. R. C. Sandlass is chief engineer and general manager.

The Fraser Machine & Mfg. Co., Poston, succeeds to the special automatic machinery business of Warren F. Fraser. Small metal goods will be manufactured and the company will be in the market for oxidizing and japanning apparatus.

The Armstrong Iron Works, Vineland, N. J., have been sold to John G. Snowden who intends to enlarge the plant.

Furnace Activities:—

The Quinn Furnace Co., Gadsden, Ala., announces that its charcoal furnace, which has been thoroughly overhauled, will be started during the latter part of February, with an output of about 75 tons daily. The company has been incorporated for $200,000 with A. H. Quinn as president, P. P. Williams vice president and W. F. Johnson secretary and treasurer. Raw materials will be furnished by two subsidiary concerns, the Chalybeate Mountain Ore Co. and the Rock Springs Stone & Ore Co. J. F. Hollowell is to be furnace superintendent.

The Alabama Consolidated Coal & Iron Co., Birmingham, Ala., is preparing to blow in its second stack at Gadsden about April 1.

The Dover Iron Co., Bear Spring, Tenn., it is reported, has purchased from the Cumberland River Land Co. the two furnaces, Bear Spring and Carlisle, which it has been operating under lease. Both are charcoal furnaces and were

first built about three-quarters of a century ago. Their combined annual capacity is about 10,000 tons.

R. A. Carter, president of the Monongahela Iron & Steel Co., Pittsburg, has practically closed a deal for the purchase of the Ivanhoe furnace, Ivanhoe, Va. It is stated that extensive improvements will be made to the plant, which is well-equipped and operates a small foundry.

The blast furnace at Talladega, Ala., operated by the Northern Alabama Coal, Iron & Railway Co., is being repaired and will be blown in in the near future.

The Norton Iron Works, Inc., Ashland, Ky., is thoroughly overhauling and repairing its furnace and will probably be ready to blow in about May 1.

The Chattanooga Iron & Coal Co. expects to have its new 150-ton furnace ready to blow in soon after March 1.

The stack of the Sloss-Sheffield Steel & Iron Co. at Birmingham, which has been idle for some time undergoing repairs, is to resume operations about March 1.

Fires:—

The Taunton Wire Nail Co., Taunton, Mass., suffered a $12,000 loss by fire Jan. 16. The plant of the Taunton Twist Drill Co. nearby escaped damage.

The Marks Mfg. Co., Chicago, has begun the construction of a building 100 x 365 feet to replace the plant at Evanston, Ill., recently destroyed by fire.

F. E. Myers & Bro., Ashland, O., are preparing plans for the reconstruction of their tool and implement storehouse, recently razed by fire, on a more extensive scale. Shipments are being continued without interruption.

Trade Notes:—

The American Steel Dredge Works, Logansport, Ind., recently organized by James P. Karr and John D. Rauch, announces that its plant is now in complete operation.

The Fischer Foundry & Machine Co., Pittsburg, announces that it has moved its offices from south 21st street to rooms 712-13-14, Empire Bldg. Steel, brass and bronze casting departments have been added to its plant and the gray iron department has been enlarged so as to handle castings up to 65 tons.

The Interstate Machinery & Supply Co., Wilmington, N. C., will represent manufacturers and handle a line of mill supplies. Connections are sought with manufacturers of engines and boilers.

The Bessemer and Lake Erie Coal Mining Co., Rochester, N. Y., has taken over the property of the Bessemer Coal Mining Co. of Reynoldsville, Pa., which property is located at Ferris, Pa., on the B. & L. E. Railroad. It is installing the very latest improved mining machinery and after February 1st will produce about one thousand tons per day. The Pickands-Magee Coke Co. of Pittsburg has been made the exclusive sales agent for its production.

The B. M. Jones Co., Inc., Boston, will sell the "Mushet" steels and steel tools of Samuel Osborn & Co., Sheffield, Eng., in the United States, Canada and Mexico, as well as act as representatives in this territory for the Clarence Iron Works, Leeds, Eng., operated by Taylor Bros. & Co., Ltd.

The Lewis Foundry & Machine Co., Pittsburg, reports that it has booked a large number of orders for its even depth chilled rolls and for lever, squaring and vertical shears.

The Morgan Construction Co., Worcester, Mass., reports the following contracts recently secured: Illinois Steel Co., Milwaukee; four Edwards automatic cooling beds, back shear tables, etc.; 2-190 feet long, 2-125 feet long; to handle straight product of the 12 inch, Nos. 1 and 2-9 inch, and the 8 inch merchant mill trains at the Bay View works and designed for handling flats up to 6 inches wide. George-Marien-Bergwerks & Huetten-Verein, Osnabrueck, Germany; one merchant mill with two automatic cooling beds 40 feet and 300 feet and a storage pocket equipment for bars 300 feet long; will take a 4 x 5 inch billet, and will roll rounds from 7-16 inch to 1 13-16 inch or equivalent sections; can be operated with small billets to finish down to ¼ inch round or equivalent. Youngstown Sheet & Tube Co., Youngstown, O., one continuous skelp mill for rolling skelp 4¼ x ⅛ inch and lighter sections, including heating furnaces, gas producers, shears and all other auxiliary equipment; will supplement a Morgan continuous billet and a Morgan continuous sheet bar mill ordered last year and now in process of erection. Milliken Bros., Staten Island and New York City; two special continuous heating furnaces for beam blanks with special pull out mechanism, and five 33-inch Dyblie valves for open-hearth work; the rights for the sale of these valves, which were developed by Mr. J. A. Dyblie at the works of the Illinois Steel Co., have been acquired by the Morgan Construction Co.

The Duncannon Iron Co., Duncannon, Pa., recently installed one 12-inch train of rolls built by the Lewis Foundry & Machine Co., at Coraopolis, Pa. The new train will be used for rolling merchant iron.

TRADE PUBLICATIONS.

The Allis-Chalmers Co., Milwaukee, has issued two bulletins describing, respectively, the Tremaine steam stamp for use in mining work and lathe mills and bolters for saw mill work.

A. D. Granger Co., New York and Pittsburg, has issued a handsome catalog entitled "Complete Power Plant." It discusses the advantages of having a work of this character done by a firm which will act both as engineers and contractors and and presents some examples of the work which has been done by the Granger Co.

C. W. Hunt Co., New York City, has brought out a catalog describing the Hunt industrial railway. It is a narrow gauge road for use in machine shops and other manufacturing plants, and is thoroughly illustrated in the catalog. Cars and various forms of track, cross overs, switches, etc., are all described and illustrated, together with such accessories as are needed for the operation of the railway.

The Hamilton Machine Tool Co., Hamilton, O., has issued its 1906 planer and shaper catalog. This is a handsome publication of eighty 6 x 9 pages, and describes thoroughly the large line of planers and shapers manufactured by this company. The planers listed range in size from 30 x 30 inches to 72 x 72 and 90 x 57 inches, the latter having four heads on the cross rail. A number of different types of shapers are listed, of both the single and back gear type. The catalog is well printed and splendidly illustrated.

TIPS FROM THE CONSULS.

Consul McNally, of Liege, reports that an order for 8,000 tons of steel rails, with a considerable tonnage of accessories, was recently booked for delivery at Buenos Aires. An order for 100,000 steel sleepers has been on the market for some time and efforts have been made by the local manufacturers to obtain it. Whether the price or some other condition interfered, it is said that the order is now to go to a German maker who specializes on this particular work.

Consul Sammons, of Niuchwang, replying to inquiries from New York parties, reports that the prospect of introducing some simple type of hand power woodworking, cotton, spinning and weaving, rope-making and silk-weaving machinery into Manchuria is fairly inviting, but until the mines and industrial enterprises are exploited machinery on a large scale will not be in extensive demand. In northern Manchuria flouring mills have been successfully established by the Russians.